COMPUTERS AND INNOVATION IN THE HOSPITALITY INDUSTRY

A STUDY OF SOME FACTORS AFFECTING MANAGEMENT BEHAVIOUR

A thesis submitted by
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in fulfilment of the requirements for the award of the degree of Ph.D.
in the Department of Management Studies for Tourism and Hotel Industries
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1986
To Sylvia, Luke and Annabelle
Computers and Innovation in the Hospitality Industry

Synopsis

This research sets out to test the hypothesis that the effects of technological innovation with computers, in the hospitality industry, may be related primarily to the values and attitudes of the managers who might propose the innovation. Ways of thinking about the innovation are made explicit by the manner of its introduction. Secondary factors may then be used to support change by means of structural and/or procedural modifications to the organisation. Taken together it is proposed that these elements determine the effect of the technology.

An examination of the literature shows that existing studies tend to take the view that technology is an exogenous, independent variable though a primary, contingent factor affecting organisation structure and the relationships of organisation members. There appears to be no necessary reason why this should be so. Some technology is generated endogenously and it may be argued that organisations may seek to shape their own technological environment.

In the context of technological innovation with computers, conflicting views between theorists may be observed. A computer system may change the information environment of managers and others, with important consequences. Attempts to depoliticise the nature of technological innovation may support more neatly the impact of technology paradigm but are hardly tenable when tested against an empirical model. The situation is rendered more complex by the fact that few existing studies are set in the context of a service industry.

In view of this theoretical incoherence, the research has used a technique of methodological triangulation in order to study management innovation decisions in the hospitality industry. A survey was conducted to obtain a world view and a point of comparison for management attitudes. Repertory grid techniques were employed to obtain a measure of attitudes at the individual level. Finally, grid analysis was used in conjunction with case studies in order to obtain a holistic perspective. Consequently the differing effects of power and politics may be discerned more clearly and some factors which may be used to predict the likely effects of a technological innovation with computers were identified.

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Acknowledgements

In writing a thesis, one cannot help but realise the extent to which one is indebted to others for their guidance and support. I remain conscious of the influence of Professor Philip Nailon, mentor and friend of many years, whose teaching and example has done so much to shape my intellectual perspective of the world. I am obliged too, to colleagues who have helped me by discussing ideas and by offering criticism. I should like to thank Mr. Michael Riley and Dr. Yvonne Guerrier for their contributions to my early attempts to establish an approach based on repertory grids. I am particularly grateful to Dr. Colin Hales for his reading and incisive criticism of two chapters. His salutary comments caused me to ponder my arguments more deeply and hopefully, to present them more cogently and precisely. I should also like to thank especially Dr. Maureen Pope whose advice on the use of grid techniques and whose comments on chapter three were extremely valuable.

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The patience and kind co-operation of many busy managers in the hospitality industry has been surpassed only by that of my own family. My wife and children have tolerated my commitment to this work, and its effects on me, with great forbearance.

Principally, I am grateful to Dr. James Thomson. There is little doubt in my mind that without his guidance, constant support and encouragement the work would never have been completed. There are many dark hours in a project of this type and many moments of despondency. Dr. Thomson's unfailing patience, his careful comments on my drafts and his enthusiasm on my behalf have been the inspiration for me to continue. I hope this thesis does justice to his efforts.

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CHAPTER 1

The Context of Organizational Development in the British Hotel & Catering Industry

1 The Size and Structure of the British Hotel and Catering Industry

1.1 The Elements of the Hotel and Catering Industry

The term "hotel and catering" industry does not lend itself to easy definition. In the United Kingdom it is a collective label used to describe an amorphous group of some one third of a million outlets, providing products and services ranging from hotel accommodation to prison meals. Official categorisations used by government departments for statistical description, such as the Standard Industrial Classifications (SICs), are often too narrow for this industry. In the case of the SIC (1968) minimum list headings 884 to 888 for example industrial, welfare and transport catering is only included if the service is operated by contractors. Similarly, the Department of Employment chooses not to combine both commercial and non-commercial sectors in published figures.

For convenience the major sectors of the industry might be grouped as shown in table 1. The problem of providing precise definitions, necessary for valid statistical description, is immediately evident from the table. For clarity of representation sectors have been grouped under broad, albeit easily challenged headings. For example, although listed under non-commercial there are obviously private, commercial units operating in education, hospitals and residential homes. Most contract caterers are commercial in character but they provide services which are offered to end users (consumers) on a non-commercial basis. There are elements of accommodation (hotel services) in clubs, hospitals and even transport. Whilst not listed under "food", it is acknowledged that public houses account for a substantial proportion of restaurant (catering) sales.
# TABLE 1

Elements of the Hotel and Catering Industry

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</tbody>
</table>
The position is complicated further by differences in size and scale between elements of each sector. To discuss an element as if it were homogeneous could therefore be misleading, even if more complete data were available. Data are incomplete either because some businesses in this industry are so small that they avoid, or are excluded from commercial or social registration, or because the classification of accounts in some large organizations does not identify some categories in isolation. Thus secondary sources are incomplete in many respects. Data such as the number of guest houses in the United Kingdom or the value of food served by hotel room service departments are not available.

1.2 Turnover and Scale of the Accommodation Sector

Most sources are agreed that the industry's turnover is large and in the commercial sector it is the accommodation sales element that is dominant. In 1982 Britain's total earnings from tourism (including payments to airlines and shipping companies) exceeded seven billion pounds. Of this total, approximately three billion was spent by domestic tourists. Although not all such tourist money was spent on hotels, a substantial proportion accrues to this part of the accommodation sector which has recorded steady and significant growth in recent years. The data in table 2 indicate the distribution of revenues accruing to hotels and restaurants and the growth which has taken place in both real and money terms in recent years.

Despite these enormous revenues, it must be recognised that the "average" British hotel is a small business of less than 20 bedrooms. It is also unlikely to be licensed. According to the Hotels and Catering National Economic Development Council in 1974, 90.7% of hotels had less than 25 bedrooms and 64.7% of these were unlicensed. More recent data do little to suggest that this pattern has changed. In general, the pattern of size and ownership of hotel stock is roughly related to its age. In countries with many old hotels (mainly inns, guest houses and hostelries), the hotels tend to be small and privately owned. This is true of most
### TABLE 2

**Turnover and Growth in the Commercial Hotel and Restaurant Sector 1974 - 1981**

<table>
<thead>
<tr>
<th>Year</th>
<th>Hotels &amp; Guest Houses (£ million)</th>
<th>Restaurants &amp; Snack Bars* (£ million)</th>
<th>Hotels &amp; Guest Houses (1980 = 100)</th>
<th>Restaurants &amp; Snack Bars* (1980 = 100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974</td>
<td>935</td>
<td>1098</td>
<td>85.5</td>
<td>116.2</td>
</tr>
<tr>
<td>1975</td>
<td>1132</td>
<td>1275</td>
<td>88.0</td>
<td>111.6</td>
</tr>
<tr>
<td>1976</td>
<td>1404</td>
<td>1458</td>
<td>92.3</td>
<td>106.2</td>
</tr>
<tr>
<td>1977</td>
<td>1760</td>
<td>1651</td>
<td>99.1</td>
<td>103.7</td>
</tr>
<tr>
<td>1978</td>
<td>2164</td>
<td>1910</td>
<td>105.1</td>
<td>105.1</td>
</tr>
<tr>
<td>1979</td>
<td>2493</td>
<td>2254</td>
<td>102.0</td>
<td>107.6</td>
</tr>
<tr>
<td>1980</td>
<td>2888</td>
<td>2534</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>1981</td>
<td>3173</td>
<td>2813</td>
<td>96.8</td>
<td>94.2</td>
</tr>
</tbody>
</table>

**Annual % Growth**

- **Turnover**: 34.2% 22.3%
- **Real Expenditure**: 1.4% -2.4%

* includes contract catering

**Sources:**
- Catering & Allied Trades - Business Monitor 1977
- Catering & Allied Trades - Business Monitor 1980
- Estimates pre-1977 by MMD Consultants - 1984
northern European countries like France, Germany, Holland, Belgium and the UK. In countries where much of the hotel stock has been built to meet the needs of the post war package tour market, such as Spain, Tunisia and to some extent Yugoslavia, the hotels tend to be newer and on average larger.

Tables 3 and 4 describe the commercial accommodation market. It will be noted that not only are unit sizes small, but ownership is also quite fragmented. Jordan Surveys (2) indicated in 1982 that of 329,500 hotel bedrooms in the UK, the top 28 hotel companies control 88,950 rooms, or about 27% of the total. On this reckoning, by far and away the biggest operator of hotels in the UK is Trusthouse Forte PLC with 22,470 rooms, a figure nearly three times that of the next largest hotel company Crest (a division of the brewery company Bass Charrington PLC) which only controls 7,650 bedrooms.

Estimates on fragmentation vary and frequent changes in ownership, expansions and divestments make the definitive position hard to discern. According to the Hotel & Catering Research Centre in 1984 (3), there were thought to be 145 hotel groups in the UK i.e. companies owning more than one hotel or consortia of independent hotels. These groups were estimated to operate 2,000 hotels with an average size of 72 bedrooms, representing 48% of the total supply. To the extent that marketing consortia are not able to demand compliance to centrally agreed methods of procedure and operation in a manner of which a corporate central office is capable, the inclusion of consortia is misleading.

Jordan Surveys (4) identify 25,000 bedrooms under the control of consortia. In terms of central management control it is probably reasonable to assume that approximately two thirds of hotels are operated as independent, small businesses. Litteljohn (5) has gone so far as to suggest that this presents particular commercial problems and that smaller independent hotels may face a limited future or at best be prepared to accept lower financial returns than is currently the case. Other writers disagree (6) but there is no doubt that producer co-operatives, mainly
### TABLE 3

The Supply of Commercial Accommodation in England, Scotland and Wales

<table>
<thead>
<tr>
<th></th>
<th>Hotels/Motels</th>
<th>Private Hotels*</th>
<th>Holiday Camps</th>
</tr>
</thead>
<tbody>
<tr>
<td>England</td>
<td>21,000</td>
<td>17,000</td>
<td>600</td>
</tr>
<tr>
<td>Scotland</td>
<td>2,950</td>
<td>3,400</td>
<td>500</td>
</tr>
<tr>
<td>Wales</td>
<td>1,200</td>
<td>2,700</td>
<td>500</td>
</tr>
</tbody>
</table>

* includes farm houses, licensed private hotels, guest houses

Source: Statistical Review of the Hotel & Catering Industry
Catering Intelligence Unit, Consumer Industries Press, London 1984, p1
### TABLE 4

The Structure of the Commercial Accommodation Sector in the United Kingdom

<table>
<thead>
<tr>
<th>LARGE HOTELS</th>
<th>SMALL HOTELS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Rooms</td>
<td>Outlets</td>
</tr>
<tr>
<td>201+</td>
<td>150</td>
</tr>
<tr>
<td>101 - 200</td>
<td>260</td>
</tr>
<tr>
<td>51 - 100</td>
<td>800</td>
</tr>
<tr>
<td>26 - 50</td>
<td>1,990</td>
</tr>
<tr>
<td>11 - 25</td>
<td>6,540</td>
</tr>
<tr>
<td></td>
<td>9,740</td>
</tr>
</tbody>
</table>

|          | 300        | 3.0 |
| Motels   |            |    |
| Holiday Camps | 90  | 0.9 |

<table>
<thead>
<tr>
<th></th>
<th>10,130</th>
<th>100.0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>43,000</td>
<td>100.0</td>
</tr>
</tbody>
</table>

focused on marketing are on the increase. In 1981 the world’s largest, international hotel consortium, Best Western International represented 2,761 hotels with a total of over 200,000 bedrooms. In the UK alone there were 9 marketing co-operatives at that time with a membership of 592 hotels (7).

1.3 Turnover and Scale of the Catering Sector

By contrast, the catering sector is dominated by services of a non-commercial character. Whilst hotels, particularly small hotels, account for the bulk of turnover in the accommodation sector an estimate by the Institute of Grocery Distribution (8) has suggested that they sell only 4.2% of meals consumed, where a meal is "any transaction involving use of a dinner plate or take away pack". Catering markets are equally hard to define, statisticians taking differing stances on the inclusion of drinks or the service of meals in places like prisons. Euromonitor Market Research (9) have valued the total United Kingdom hotel and catering market at £19.9 billion, of which £4 billion went on accommodation, £5.5 billion on food, £5.3 billion on drinks, £3.8 billion on institutional catering in schools, hospitals and prisons and the remainder on other forms of catering.

Table 5 shows the structure and purchasing power for the catering market as a whole. Data are based on number of outlets and value of food purchases providing a more objective comparison than that of the Euromonitor figures since results are not biased by the effect of price markups. It may be noted that education, canteens, health care and public services which largely encompass the non-commercial sector represent only 24.8% of outlets yet purchase 40.9% of food consumed outside the domestic situation. In particular, the 3.7% of outlets in the health care sector purchase a disproportionate 17.1% of food. In general terms it is probably reasonable to argue that on a daily basis, most meals produced outside the home are served in educational establishments, industrial canteens, hospitals and (commercially) in cafes.

P.R. Gamble
TABLE 5

Structure and Purchasing Power of the UK Catering Market

<table>
<thead>
<tr>
<th>Sector</th>
<th>No. of Outlets</th>
<th>%</th>
<th>Food Purchases £m*</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pubs</td>
<td>73,210</td>
<td>23.0</td>
<td>298.1</td>
<td>8.8</td>
</tr>
<tr>
<td>Clubs &amp; Entertainment</td>
<td>60,630</td>
<td>19.1</td>
<td>179.5</td>
<td>5.3</td>
</tr>
<tr>
<td>Hotels</td>
<td>53,130</td>
<td>16.7</td>
<td>664.0</td>
<td>19.7</td>
</tr>
<tr>
<td>Education</td>
<td>37,720</td>
<td>11.9</td>
<td>417.4</td>
<td>12.3</td>
</tr>
<tr>
<td>Cafes and Take Aways</td>
<td>37,670</td>
<td>11.8</td>
<td>470.4</td>
<td>13.9</td>
</tr>
<tr>
<td>Canteens</td>
<td>26,050</td>
<td>8.2</td>
<td>375.3</td>
<td>11.1</td>
</tr>
<tr>
<td>Restaurants</td>
<td>13,400</td>
<td>4.2</td>
<td>214.6</td>
<td>6.3</td>
</tr>
<tr>
<td>Health care</td>
<td>11,930</td>
<td>3.7</td>
<td>581.7</td>
<td>17.1</td>
</tr>
<tr>
<td>Public services</td>
<td>3,050</td>
<td>1.0</td>
<td>20.0</td>
<td>0.6</td>
</tr>
<tr>
<td>Fast Food</td>
<td>1,180</td>
<td>0.4</td>
<td>115.5</td>
<td>3.4</td>
</tr>
<tr>
<td>Travel</td>
<td>220</td>
<td>0.1</td>
<td>48.5</td>
<td>1.4</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>318,190</strong></td>
<td><strong>100.0</strong></td>
<td><strong>3,385.0</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

* 1981 manufacturers' or suppliers' prices

Source: Institute of Grocery Distribution, 1983
1.4 Manpower and Employment

Large numbers are also evident when employment statistics are discussed. Again, the precision of the data are open to question though for the purposes of this discussion the orders of magnitude that they represent are sufficient. In terms of manpower, the hotel and catering industry is the largest individual industry in the UK as is illustrated by table 6.

Notions of labour utilisation serve to underline the relative size and importance of the hotel and catering industry. The past decade has been one of structural change for the British economy, in which nearly three million jobs have been lost in energy, construction, manufacturing and agriculture, a loss which has not been entirely offset by the gain of just over one million jobs in services. (10) Indeed the effects of this structural change are more evident in the UK than in several other developed economies.

The shift to service industries is more marked in the UK than in that of other important world economies. Given that the share of manufacturing in the economy of the USA has been relatively low for twenty years, of the UK, USA, Japan, Germany, France and Italy only Japan is increasing the importance of its manufacturing sector to any great degree. In fact, British manufacturing industry has experienced a sharper decline than that of any major economy with which it may be considered to compete. Thus, according to 1985 Bank of England figures, in 1964 manufacturing accounted for 30.2% by volume of gross domestic product (GDP) and 33.9% of employment in the UK while services accounted for 51.8% and 51.3% respectively. By 1981, these divisions had changed so that manufacturing accounted for only 24.9% of GDP and 25.6% of employment whilst services contributed 55.6% of GDP and 63.4% of employment. The structural shift is even more evident if the contribution to GDP is considered in terms of value. Changes in the relative price of services and manufactures over the past twenty years emphasise the swing even more.
### TABLE 6

UK Industries Ranked by Number of Employees in 1984

<table>
<thead>
<tr>
<th>Rank</th>
<th>Industry</th>
<th>Number of Employees (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hotel and Catering</td>
<td>2.3</td>
</tr>
<tr>
<td>2</td>
<td>Education</td>
<td>1.6</td>
</tr>
<tr>
<td>3</td>
<td>Medical and other Health Services</td>
<td>1.3</td>
</tr>
<tr>
<td>4</td>
<td>Retail Distribution (exc. food &amp; drink)</td>
<td>1.2</td>
</tr>
<tr>
<td>5</td>
<td>National and Local Government</td>
<td>1.0</td>
</tr>
<tr>
<td>6</td>
<td>Construction</td>
<td>1.0</td>
</tr>
<tr>
<td>7</td>
<td>Mechanical Engineering</td>
<td>0.8</td>
</tr>
<tr>
<td>9</td>
<td>Electrical and Electronic Engineering</td>
<td>0.7</td>
</tr>
<tr>
<td>10</td>
<td>Food, Drink and Tobacco Manufacture</td>
<td>0.6</td>
</tr>
<tr>
<td>11</td>
<td>Retail Distribution of Food and Drink</td>
<td>0.6</td>
</tr>
<tr>
<td>12</td>
<td>Agriculture, Forestry and Fishing</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Source: Department of Employment National Population Census 1984
Department of employment figures exclude those occupied in the hotel and catering sectors of local authorities, education, welfare and employee feeding undertaken by companies in-house. However, table 7 seeks to reflect the shift to service employment and demonstrates the contribution of the hotel and catering sector. In addition to hotel and catering, figures for the service sector as a whole include insurance, banking, finance and business services, professional and scientific services and miscellaneous services.

According to the Hotel and Catering Industry Training Board (HCITB) in 1982 the majority of employment within the industry was concentrated in hotels and guest houses (11). Whilst other analysts (12) feel that the HCITB estimates for total employment may be rather high due to an element of double counting attributed largely to the number of part time workers in the industry the distribution indicated in table 8 is sufficiently descriptive.

The difficulty of obtaining accurate figures is also attributable to the seasonal nature of the industry. Over the year employment may fluctuate by as much as 10 percent. For many years, some workers in the commercial accommodation sector have made a practice of taking employment in the resort towns during the pleasant summer weather and then, should they not be mobile enough to relocate in a commercial centre, either accepting unemployment or other work during the winter. To offset this fluctuation in the level of business for the hotel industry many resort towns have undertaken a variety of measures to promote conference sales in off peak periods.

The success of such measures in employment terms is however hard to determine. Whilst women made up 39% of the total working population in 1983 according to the Department of Employment and 43% of employees in employment, they constituted 73% of the work force in the hotel and catering industry. This in itself is not a problem of course. When the fact that nearly 75% of these are part time is taken into account, a situation emerges in which the industry employs just over 1.1 million part
time female workers. It has also been estimated (13) that about 80% of these are unskilled.

Despite their predominance of employment roles, women do not constitute the majority of management positions within the industry. 55% of managers are male. (14) A study conducted in 1983 (15) suggested that the level of education and training in the industry is low. Only 10% of full time employees hold a supervisory or management qualification. Supervisory qualifications enumerated by the survey would include catering diplomas obtained in further education such as an Ordinary National Diploma.

Indeed, within the industry as a whole only 36% of full time employees hold any kind of qualification at all. The most common types of qualification relate more to craft areas in catering rather than to specialist management for this particular industry. A fact reflected in the survey that was carried out for this research and which is reported in chapter 6.

In general, surveys of personnel in the hotel and catering industry tend to under represent part time employees, most of whom are women due to problems of availability and time. They are less available and have less opportunity to take part in such research. Since there is no reason to suppose that part time employees undertaking unskilled work are likely to be qualified at a high level, it seems reasonable to conclude that the proportion of hotel and catering managers with formal training in the design and use of decision support systems is very low indeed.
<table>
<thead>
<tr>
<th>Year</th>
<th>Total (000s)</th>
<th>Service Sector (000s)</th>
<th>Hotel &amp; Catering (000s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974</td>
<td>22789</td>
<td>6474</td>
<td>796</td>
</tr>
<tr>
<td>1975</td>
<td>22710</td>
<td>6861</td>
<td>826</td>
</tr>
<tr>
<td>1976</td>
<td>22543</td>
<td>7075</td>
<td>850</td>
</tr>
<tr>
<td>1977</td>
<td>22619</td>
<td>7134</td>
<td>863</td>
</tr>
<tr>
<td>1978</td>
<td>22777</td>
<td>7314</td>
<td>884</td>
</tr>
<tr>
<td>1979</td>
<td>23106</td>
<td>7572</td>
<td>933</td>
</tr>
<tr>
<td>1980</td>
<td>22870</td>
<td>7707</td>
<td>961</td>
</tr>
<tr>
<td>1981</td>
<td>21718</td>
<td>7652</td>
<td>930</td>
</tr>
<tr>
<td>1982</td>
<td>21244(^p)</td>
<td>7645(^p)</td>
<td>940(^p)</td>
</tr>
<tr>
<td>1983</td>
<td>20924(^p)</td>
<td>7619(^p)</td>
<td>916(^p)</td>
</tr>
</tbody>
</table>

Annual % Growth
(1974 - 1982) -0.9 2.0 1.7
\(^p\) = provisional

Notes:
1. Hotel and catering figures are included in service sector employment figures.
2. Data for employment in the hotel and catering sector do not coincide with those from other sources due to differences in definition, referred to in the text.

Source: Department of Employment
### TABLE 8

**Distribution of Employment in the Hotel and Catering Industry 1982**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotels and guest houses</td>
<td>555,000</td>
<td>25.4</td>
</tr>
<tr>
<td>Restaurants and Snack Bars</td>
<td>365,000</td>
<td>16.7</td>
</tr>
<tr>
<td>Public Houses</td>
<td>454,000</td>
<td>20.8</td>
</tr>
<tr>
<td>Clubs</td>
<td>152,000</td>
<td>6.9</td>
</tr>
<tr>
<td>Industrial Catering</td>
<td>155,000</td>
<td>7.1</td>
</tr>
<tr>
<td>Local Authorities inc. education</td>
<td>340,000</td>
<td>15.6</td>
</tr>
<tr>
<td>Health Care</td>
<td>165,000</td>
<td>7.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,186,000</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

**Sources:**
- Department of Employment
- Hotel and Catering Industry Training Board
- MMD Management Consultants
- Boella (16)
1.5 Summary of Industry Structure and Rationale for the Research

The role of service industries within major developed economies has acquired greater importance in the last two decades. In the United Kingdom the services sector now accounts for over half the economy. The hotel and catering industry is an important constituent of this sector, larger in volume than financial and business services (17) representing just under 20% of the service economy as a whole.

As an industry, hotel and catering is difficult to codify and classify accurately due to differences in definitions used by alternative statistical series. There can be little disagreement however that its two principal activities are the provision of accommodation and the preparation and service of food. Accommodation services are largely provided by commercial organisations. Here, there is relatively little concentration of ownership. Most hotel businesses are small, independent units. However this pattern seems to be changing and about 25% of units belong to organisations controlling more than one hotel and a further 25% of independent hotels belong to marketing consortia. Most food outlets are also in the commercial sector but the largest number of meals, measured by amount of food purchases, takes place in the non-commercial sector notably in health care and employee feeding.

The industry is labour intensive. Given an employed, national workforce in 1983 of 20.8 million (18) after deducting those in the forces, the unemployed and the self employed the hotel and catering industry occupies about 10.5% of the total UK workforce. A large proportion of the industry's employees is female, part time labour. The general level of education and training of its workers is not high. Few managers are graduates in vocational or business courses. Indeed, such qualifications as are likely to be held are mainly based on craft courses from further education, that is, those followed by a school leaver between the ages of 16 and 18.
The impact of technology, particularly that derived from computing and telecommunications, is therefore of special interest. Increasing scale of operation is likely to carry implications for the nature of communications and the structure of organisations. Problems of control and co-ordination are likely to be exacerbated by increasing scale. Such problems may result in a trend to centralisation which is not always considered desirable in an industry associated with personal commitment and service. However, technology may also be seen as a solution to increasing both quality and productivity without commensurate increases in labour costs and training. Further, technology may be used to compensate for skill shortages especially at management levels. A study of these factors in the commercial accommodation and non-commercial feeding sectors was therefore determined to be of interest.

Organisational Development and the Hotel and Catering Industry

There can be little doubt that however it might be defined to include or exclude certain categories of activity, the hotel and catering industry has a long past. The need for travel and the concomitant needs of travellers for shelter and sustenance are woven into the fabric of history. Records of the size and structure of the tourist industry in the UK prior to the arrival of the Romans are scant, though some historians have referred to an order of people called beatachs or brughnibhs who existed in the time of the Druids. Their role being to keep open houses for the purpose of hospitality. Better documented are the activities of the Romans who originated several kinds of establishment. They set up a system of post houses called mansiones or stabulae along the highways and most towns saw the establishment of the prototypical public house in the form of a bibulum or drinking shop. There are many references to taverns in major towns such as Chester, Londinium and Eboracum (York) which also served food.
It has been suggested that,

"Such is the resemblance between these and more modern times, and so gradual has been the development since the first days of hospitality that the early times warrant more than a passing mention in an historical outline." (19)

The implication that modern hotel and catering organisations bear a not inconsiderable resemblance to their ancient progenitors warrants more than cursory dismissal. Some modern hotel managers interviewed during this research expressed sentiments which conveyed a belief that the fundamental character of the industry was immutable. Their reference frame for these assertions was almost certainly shorter than 2,000 years but it carried an equal conviction of fundamental stability in terms of purpose, process, product and structure.

Yet it is certain that some change has taken place. Changes in the legal, technical, political and cultural framework in which an activity takes place necessitate adaptations in organisms with an intention to survive. Given the pervasive nature of change and the corresponding coping cycle that is required to deal with it, perhaps survival of an organisation alone can be taken as a sign that it has changed or in some senses, developed. Starbuck (20) has suggested that the very process of ageing is in itself a sign that the organisation has grown and developed. Such a definition lends itself very little to the generation of new insights as to how and why adaptations occur.

Bennis, a leading exponent of the origins and nature of change in organisations has proposed a definition of organisational development as,

"a response to change, a complex educational strategy intended to change the beliefs, attitudes, values and structure of organizations so that they can better adapt to new technologies, markets and challenges, and the dizzying rate of change itself." (21)
Of course, it may be argued that the process of adaptation is more forced on managers by outside factors than the result of strategies chosen to attain a goal. Such an evolutionary approach lends itself to an ecological view of organisations along Darwinian lines. Thus it may be argued that differences in the preferred style of operation between one organisation and another eventually result in the survival of some and the demise of others. Successful styles are copied until they represent a dominant type. Differences begin to emerge due to competitive pressures and the cycle repeats itself in the face of further changes. Biological analogies of this sort are not unknown in economics (22) or indeed elsewhere. Marketing theorists have employed similar sets of propositions to explain the life cycle of products (23). Weber (24) has postulated that particular forms of organisation can only exist in certain cultural conditions. More recently other writers on the theory of organisations such as Buckley (25) or such as Aldrich and Pfeffer (26) have proposed models not too dissimilar to that outlined.

To some extent such notions accord quite neatly with the view of organisations as open systems put forward by Katz and Kahn (27). Some common characteristics of open systems include many elements consistent with an evolutionary pattern of development. Open systems import energy from outside for a number of reasons. The energy is used to defeat natural entropic processes and acts as the basis of a stimulus to behave. The energy is transformed as part of the basic conversion process of the system to produce an output. This pattern of energy exchange has a cyclic character. The product exported to the environment furnishes further sources of energy for a repetition of the cycle. A further property of open systems is differentiation. Diffuse, global patterns are replaced by more elaborate and specialised functions. Such differentiation makes the system more efficient but, by implication, renders it more vulnerable to change. It is of little surprise to discover that Katz and Kahn acknowledge that they have drawn freely on ideas put forward by a biologist. As long ago as 1932 von Bertalanffy (28) was proposing that an open systems approach for the study of living systems would be more productive than the hitherto closed system model used in physics and
physical chemistry. Thus a thread of ideas can be identified stretching over some 40 years.

Ideas that may be acceptable to organisation theorists however are far from satisfactory to those interested in organisational development. It is self evident that a completely open system would be unable to maintain an identity separate from its environment. There could be no distinction in social terms of those who belonged to the organisation and those who did not. Some degree of boundary definition is necessary to allow for identity. Some internal stability is also needed to allow members of the organisation to develop mutually satisfying patterns of relationships and procedures. A closed organisation has the advantage of being able to concentrate on its own activities. Equally, it has the disadvantages of any closed environment in that changes in the outside world may overtake and subdue it. Thus a more productive view might be that organisations viewed as systems are not so much open as semi-permeable.

An alternative perspective on the development of organisations might therefore take account of the actions which are taken by organisation decision makers which are designed to bring about change either internally (within the organisation) or externally (within the operating environment). In many ways, this purposive approach is more comfortable in a rational, cognitive sense since it seems to take a view of managers as actors rather than simply reactors. Penrose, in providing a rationale for this approach in developing her theory of the firm took the view that,

"to treat innovations (in firms) as chance mutations not only obscures their significance but leaves them essentially unexplained, while to treat them directly as purposive attempts of men to do something makes them far more understandable." (29)

2.1 Factors which may Influence the Nature of Organisational Development

Much of the work on organisational development has been undertaken in the
context of the firm as a business enterprise and it is apparent that results obtained in one kind of enterprise do not necessarily hold true in another. Caution is also indicated in the light of the fact that few studies seem to be undertaken on a longitudinal basis. Most research data has been cross sectional, taken at one point in time, rather than being directed at the process of development over time. However, from what has been done, it may be useful to examine briefly some of the factors which may influence the nature and direction of change.

Given a purposive element in organisational development it follows that the major source of intervention in an organisation must stem from senior managers. Indeed, Beckhard (30) takes a view of organisational change in terms of attempts at intervention from the top of an organisation. Several other writers, such as Blake and Mouton (31) and Argyris (32) have noted similarly that top management must push for changes in order for those changes to be accepted or even allowed. There are proponents of contrary views (33) which point out that there is little evidence to suggest that bottom up change is in any way less effective. However, Reddin's neat observation (34) that "the penalty for mutiny is death" seems to have convinced many writers on this topic. Certainly, the motives for organisational growth have been attributed in the main to senior managers who, it is assumed, generally make decisions on organisational policy (35). The level at which changes should be initiated when they are supported by top management is far less clear, especially for those changes which involve technology. Intuitively it would seem reasonable to institute such changes in "technological departments", those most affected by such change but technological departments are uncommon in hotel and catering organisations.

Even a casual observer of the modern world may be inclined to subscribe to the view that the pace of technological and social change is increasing. To what extent such perceptions are valid in a historical context is not easy to judge. Be that as it may, it is difficult to find a writer in the field of organisation theory who does not accept that most social and technical environments are becoming more turbulent. Turbulence is
associated with uncertainty and increasing difficulty in strategy formation. Of particular importance in this context is the growing emphasis on the need to improve an organisation's capabilities for processing information. In an information literate organisation, uncertainty heightens the perceived need for more efficient information search and processing functions (36). The term 'information literate' is used here in the sense of a management group predisposed to identify and seek data perceived to be relevant to current problem environments. Once again, it may be hard to apply this generality to managers in the hotel and catering industry especially in view of the level of training and education that they are likely to have experienced.

A third important pressure for change might be ascribed to changes in the dependency relationships which the organisation requires. Dependencies may exist on co-operating organisations (collaborators such as the hotel consortia mentioned earlier), on customer groups, on work groups and, particularly in the case of non-commercial organisations in the public sector, on government. If these dependencies are being altered perhaps because of a difference in the balance of exchange between the parties or perhaps because of a change in the strength of the bond, this is likely to be perceived as a threat. The organisation is then faced with the prospect of adapting to the new situation or reducing its dependency in some way. For example, in the face of changing customer needs a hotel can either modify its product or find a new market. In general it is considered to be in the best interests of an organisation to minimise its dependence on other organisations for those resources most critical to its functioning (37). In view of the previous point, this poses some interesting questions for the hotel and catering industry as its independent capability to deploy technology in the design and operation of decision support systems is minimal.
2.2 Technology and Organisation Development

Commercial organisations in the public eye which fail to identify growth as one of their objectives are unusual enough to attract attention. Even the word 'consolidate' when used in statements by company directors carries the connotation of increased penetration of existing markets. Growth as a form of organisation development in both the public and the private sector has become almost an accepted way of life. It might even be suggested that such strategies are so central to corporate value systems that they barely need to be formalised. The relative desirability and consequent effects of such a strategy are not always welcomed. Parkinson (38) managed to criticise this tendency on the part of the British civil service so vividly that his "laws" have passed into everyday use. Despite this, the British government has continued to enshrine the principles of concentration in spheres of activity ranging from education and health care through to the provision of public services, on the lines that bigger is better. Users of the organisations affected have often been less than enthusiastic, as indeed have many members of the organisations themselves, but their complaints go largely unheeded.

Perhaps a major reason for such indifference is that growth is attractive to senior managers and administrators who can rationalise its value on many grounds. Not least of these might be the personal, growth related benefits that they themselves enjoy in terms of pay and conditions. More objectively, growth offers the prospect of increased security (and more growth) for a number of reasons. Increasing size allows an organisation to provide better career prospects to its members. It can reduce dependence on co-operating suppliers by permitting greater integration of functions or greater diversification. Recent experience on both sides of the Atlantic with firms like Rolls Royce or Penn State Railway has shown that governments are reluctant to allow firms of a certain size to fail due partly to potential impacts on the economy as a whole. Size also brings with it a certain monopoly power that makes the life easier for senior managers. In the market place a large organisation can overwhelm competition as IBM demonstrated in 1981 with its late entry into the
microcomputer market. Senior managers can accept demands from employees for higher wages more equably since these can be passed on more directly to customers. (39) In other words, growth can lead to a quiet life.

One form of growth of particular interest is that of growth through innovation. Innovation expenditures have grown at a rapid, compound rate since the early 1950s (40). Innovation supports growth by permitting entry into other fields of activity, in this sense it is a form of diversification. It allows an organisation to expand its activities and attempt to extend its sphere of control. Scherer (41) has shown that there is actually little evidence to support the view that innovation is associated with size. In the United States large firms do not secure a proportionately greater share of new patents and those that they do register are on the whole of lower quality. There is less need for a large firm to take the high risks associated with innovation for this form of growth. IBM in particular has adopted a well known corporate strategy of low innovation, preferring to dominate markets by imitation after the difficulties of invention have been suffered elsewhere.

The hotel and catering industry conforms to the scheme identified by Scherer, containing no massive organisations with monopoly power. Most firms are small or of modest size and power. There is as yet relatively little concentration of ownership, although this is increasing. It might be expected therefore that a pattern of growth based on product innovation should exist.

Technology may be both an agent of change or its instrument. New technology, or at least technology which is new to the organisation, may be used as a development factor for a number of reasons. Not least of these commercially would be competitive pressure. It may be that technology is used to support new ways of delivering the product and this in turn affects prospects for survival. The impact of technology on the development of organisations has been a popular and sometimes fruitful area of research. Effects in both commercial and non-commercial enterprises have been noted. Specialisation, cost control, employment,
size and structure, profitability, growth rate, liquidity and managerial age are just some of the factors that have been studied in relation to technology.

Unfortunately, the results of the research are somewhat inconclusive and on occasion, contradictory. For example, Woodward (42) in a well known early study of relationships between technology and organisation structure chose to disregard 20 out of a possible sample of 129 firms because she could not classify them conveniently for the purposes of her study. In any case, whilst her findings were confirmed by her own later studies and those of other recent researchers (43) they have been contradicted elsewhere (44).

Of direct pertinence are studies which have examined the effect of computers. One study found that in the case of organisations which are dependent on technology, such as hospitals, the use of computers has increased the power and control of the technocrats who understood them (45). Doctors enjoyed increased power relative to administrators because the new technology attracted private patients who would formerly have been treated at home. More latterly, the power balance shifted in favour of administrators as new data processing techniques created needs for greater co-ordination and rationalisation of support structures. On the other hand, a study in an insurance company (46) showed that the use of computers lead to less specialisation and greater delegation. Computers permitted more work to be undertaken by fewer staff, allowing departments that were formerly specialised to be grouped. Increases in capacity at low levels of the organisation (where more routine work was handled) allowed higher levels to pass their routine work downwards and so on in a kind of cascade effect. Yet another study, this time in manufacturing, showed that where computers were used for administrative purposes (not seen as central to the activities of the organisation) only marginal effects on internal restructuring were found (47).

It is difficult to avoid a conclusion that computers will affect the structure of an organisation in accordance with the intentions of
management. They may be used to centralise or decentralise decision taking or to increase or decrease power sharing. Little research has been carried out to investigate the way in which computer technology might affect service industries in general or hotel and catering in particular. On a broader scale however, Levitt writing in 1972 (48) made some important propositions about his perception of the effect of technology. In fact, he considered distinctions between service and other kinds of industry to be unhelpful.

"Purveyors of service think . . . that service is people-intensive while the rest of the economy is capital-intensive. But these distinctions are largely spurious. There are no such things as service industries. There are only industries whose service components are greater or less than those of other industries. Everybody is in service." (49)

By this argument technology could be used more productively to improve the delivery of a service. Levitt’s concern is with the way in which organisations are classified and the extent to which service by others is seen as greater service than self service. Thus he points to IBM which is classified in the USA as a manufacturing company while less than half its employees work in manufacturing. He notes that credit card companies and supermarkets are displacing service by others either by concentrating many decisions into one (as in the case of credit decisions) or by self service. The theme is developed by citing the way in which fast food companies, particularly MacDonalds, have used "technology and systems to substitute for people and serendipity". Whilst the proposition is an important one, some caution is in order. MacDonalds may not be representative of other hotel and catering businesses in an organisational sense, an issue that Levitt does not address.
2.3 The Nature of the Intervention with Technology

Writing about a very early study on the effects of office automation, interestingly enough concerning clerks in the service industry of banking, Mumford (50) warned that the introduction of any major technical change must involve the formulation of policies and strategies based on a careful preliminary analysis of all the variables operating in a change situation. In pursuing this counsel of perfection she goes on to say that,

"Technical change is like a bomb explosion. If no precautions are taken there may be widespread panic and confusion." (51)

Such stern language may seem acceptable for a study that was begun in 1960. It might be thought that a quarter of a century later, in an environment where computers are now common enough to be seen as ordinary household objects and even as toys, a more sanguine attitude would be in order.

It is doubtful if current researchers would agree with such a notion. Going back to the view of organisations as semi-permeable systems, described above, it is evident that during a period of change more open boundaries are appropriate. During this period the organisation can absorb more energy, to use the terminology already adopted, and improve its survival chances by matching what is happening elsewhere. Following the process of adaptation itself the organisation needs to lock this fit with the environment into place, by consolidating new structures and new relationships with the outside world. Naturally while doing so its boundaries become less permeable and it is less responsive to outside pressures. Thus it risks the danger that the environment may continue to change at a time when the organisation is unable and/or unwilling to respond. Subsequently the organisation may cope with the new situation by further, major changes or it may succumb. The cycle of openness, adaptation, closure repeats indefinitely (or as long as the organisation survives).
Several recent writers such as Bigelow (52) and Sheldon (53) in 1980 and Kaufman (54) in 1981 have commented on the topic in similar terms. Organisational change is described in language as dramatic as that used by Mumford as an event which may be catastrophic - sudden, unpredictable, tumultuous and dangerous. Not all organisations are expected to survive. Given such risks the problem becomes one of introducing desired changes on a controlled basis before they are forced from outside. Clearly this is not a simple matter, as it is likely to confront the status quo of existing system boundaries.

2.4 Politics of Change

The likely disruptive effects of change are proverbially well known. Analogies to eggs and omelettes being perhaps especially appropriate in a study of the hotel and catering industry. Substantial change, if forced on an organisation, will result in major redefinitions both of internal relationships and of relationships which are held with the external environment. Thus it has been suggested that "to launch a reorganisation or development programme without explicit attention to the power setting is self-defeating" (55). In some senses, the management of change can be seen as a political process with effects similar to that of growth.

Change represents the exercise of power. The successful exercise of power increases credibility which is one source of power. This in turn creates further opportunities to garner resources and extend influence. The effect was reported by Pfeffer and Salancik (56) in a study of university budget allocations. Increased spending on staffing to attract higher calibre faculty members coupled with increased expenditure on post graduate research, lead to more grants and contracts that could be used to improve quality still further. Each turn of the cycle would result in a larger, more powerful department. The process ends logically when the sub-unit controls the environment of which it is a part. In a company, the department controls the firm. In an economy, the firm controls the market.
There is a large measure of agreement amongst writers that organisations must change (develop) over time. Even to maintain existing relationships with the outside world will require some adjustments in policy, structure or behaviour. From this viewpoint, all change is forced. Whether all change is substantial, or at least, whether it is perceived as being substantial is more problematic. It is very difficult to distinguish between developments which have been introduced into an organisation by means of some strategic choice and changes which have occurred due to a necessary process of adaptation. Managers are apt to indulge in ex post rationalisation in order to support perceptions of the extent to which they control events. Some researchers are not beyond similar behaviours in order to support perceptions of the extent to which they understand the process! Such behaviours make it difficult to distinguish between development as a strategy and development as a process of ageing.

From an academic standpoint, the distinction may be barren. As Penrose (57) has pointed out, it is more useful to view organisational development as purposive. The perspective of high level decision makers will therefore have consequences for the way in which development takes place. This in turn implies that senior managers have some sort of philosophy which involves more or less continual examination of existing policies and a search for opportunities. Where this philosophy is not shared, a change of leadership may take place. Child (58) found an association between youthful senior management and corporate success. Younger corporate managers tend to challenge conventional wisdom more vigorously and Child has argued for the involvement of a wider spectrum of people in the decision process, especially younger people. Currently, technology associated with the processing of information is regarded as recently acquired or novel. It may be considered more properly to be the province of younger managers who, being more recently educated or more in touch with new techniques, may be more comfortable in dealing with it.

The influence of political processes might be expected from a number of directions. Where senior managers are seeking to develop an organisation by the use of technology, this may be perceived as unwelcome or
threatening. Other senior managers may see the development as inconsistent with the mission. Subordinate managers or operatives may see reduced opportunities or lower quality of life. Coalitions may therefore form to oppose it. Alternatively, where senior managers do not share a perception, held widely elsewhere in the organisation, that application of a certain technology is an important survival attribute, then coalitions may form to propose it.

The formation of coalitions to further shared interests has long been recognised. Cyert and March (59) noted their importance as long ago as 1963 and more recently Pfeffer (60) has commented on the effects of special interest, temporary coalitions formed to further departmental ends. Coalitions between organisations are also not uncommon where power is at stake (61). It is coalitions such as these that offset the equilibrium effect of power activities referred to above by preventing one department or organisation from dominating an environment.

Organisational politics has been defined as;

"the management of influence to obtain ends not sanctioned by the organization or to obtain sanctioned ends through nonsanctioned means." (62)

Such political behaviour may occur either because of the need to use novel means to reach an acceptable organisation goal or because the goals themselves are unacceptable. By its nature, political processes of this kind are difficult to restrain. One device by which an organisation may seek to defeat them is by increasing the apparent formalisation of decision taking. This would reinforce the nature of top down change. Some writers have gone so far as to propose the institution of an organisational planning resource (63) as a kind of signal that senior management does not propose to hold to present structures and ways of operating permanently.

The language used to describe the forces and rather fluid state of organisations under development is sometimes fanciful. It is suggested
that organisations acquire more the character of tents rather than of palaces because the former stand up better to the effect of earthquakes (64). Metaphors based on bombs or earthquakes have in common a desire to communicate the potentially devastating effects of certain types of change.

Earlier in this section a reference was made to the effects of substantial change being forced on an organisation from outside. The phrase was chosen carefully. The forces used to introduce the change may be external in the sense that they are not considered to be part of the formal decision taking processes. This would present problems in terms of the organisational hierarchy. However, most of the catastrophic effects of change, of such concern to some theorists, would seem to focus on the word 'substantial'. If the change is not seen as substantial, for whatever reason, its potential effects may be different. Thus management may be successful in creating an impression that a planned change is of little consequence or it may genuinely share a perception with its work group that this is so. This too is a political process.

2.5 Summary of Organisational Development in the Hotel & Catering Industry

In one form or another, a history of the hotel and catering industry can be traced back for many centuries. It is suggested that there is more than a passing similarity between the fundamental nature of modern food and accommodation services and those of former times. However, the very process of ageing may be evidence that adaptation has taken place and it can be argued that organisations do not so much develop but rather mutate, in response to changes forced on them by their environment. Such a view is discarded as it restricts the formation of insights which may explain the process of change.

It is generally considered that change is best introduced into an organisation by an initiative of senior managers, though the level at which the change process is begun may depend on the type of change envisaged. Intuitively, technological change might be focused on
technological departments but this presents a difficulty in the hotel and catering industry since such departments are uncommon. Nevertheless, the development of hotel and catering organisations by means of technological change might be expected to be of great importance. The structure of the industry is such that conditions for growth based on product innovation are present. The provision of higher levels of service ("more" service) through technology has been envisaged.

The potential impact of technical change is severe. Unconsidered introduction of such change could have devastating effects on the organisation into which it is brought. Some mechanism needs to be found whereby the organisation can absorb technological change by softening the boundary between itself and the environment, yet close itself off whilst the period of adaptation takes place. Persuading the organisation that both the risks of openness and the risks of closure are worthwhile is a political task. It requires a vigour more normally associated with younger than older managers. Coalitions within or between organisations may support or oppose change depending on the way in which it is perceived.

It is intended to examine the effect of the attitudes of senior managers to the introduction of technological change in some units of the hotel and catering industry. This study intends to determine the way in which changes associated with the application of small computers are perceived by senior managers and to examine some of the effects of their introduction. As a result of the study, it is expected that statements about the perceived magnitude of change based on small computers may be made. Some conclusions concerning the role and attitude of senior managers might also be expected.
Some Possible Effects of Organisational Development on the Hotel and Catering Industry

"The purpose of an organization is to enable ordinary human beings to do extraordinary things. No organization can depend on genius; the supply is always scarce and unreliable." (65)

From this passage Drucker continues an argument which largely stresses the importance of middle managers to the development and growth of organisations. His text repeatedly alludes to forecasts, made frequently during the 1950s, that middle managers were expected to become less significant, particularly due to the advent of computer based procedures. By contrast he notes that their numbers have grown. There are many possible reasons for this pattern but, in passing, Drucker draws some interesting parallels between the roles of middle and senior middle managers, their relative youth (mostly 45 or under) and the implementation of technological change.

It can be argued that as hospitality managers develop new insights into the decisions that they need to take and as they come to recognise what the computer can offer by way of removing constraints of volume, time and complexity, so computer based procedures will affect not only how hotel and catering organisations operate but also the structure of their organisations. The relationship between technology and organisation structure identified by some management writers in other fields, has not yet been fully explored in the context of the hospitality industry.

As the use of computer based procedures becomes more central to the functioning of the organisation, the links which the information system of the hotel forms with the external environment are likely to become more extensive. This will cause fundamental changes in the basis of competitive differential between hospitality companies. Competition, currently based on mere possession of information is moving to a point where huge databases held and maintained centrally by a government agency or other national (or even international) body, are accessed in some way.
by local computers. Advantage then depends on the way in which those data are analysed and interpreted.

Changes in the basis on which computers systems are justified (explored more fully in chapter 4), indeed in the attributes which are specified for those systems, implies some corresponding changes in the goal formation processes of those organisations which use them. It leads to a different model of the structure of those organisations altogether, that of an information processing model. If hotel and catering organisations seek to change products in response to the interpretations of the environment derived by its information system, a form of product innovation, then further consideration of structure is required.

In the short term, such a structure may be related to concepts first put forward many years ago. Classical theories of organisation structure were largely founded on the postulate that in a hierarchy, information flows upwards and decisions flow downwards. Any captain knows more than any lieutenant because lieutenants report to captains. Thus Taylor, Fayol, Urwick and other early management theorists took the view that since only those in management roles were likely to possess the necessary overview for decision taking, this function should be centralised and that the range of discretion at lower levels of the hierarchy should be limited.

There are a number of difficulties with this model in practice, if it is employed in an organisation where decision taking is supported by manually based information procedures. It overlooks the fact that objectives may exist which are different and distinct from those of a technical nature (66). Not all the people working in the hotel may share the view of the manager as to what constitutes the hotel's best interests. Since many labour disputes are connected with wages, it could be suggested that money is an important factor in affecting a person's choice of employer. Similarly, it is unreasonable to imagine that someone employed to make sandwiches is going to put their heart and soul into the job, all the time they are at work. By the same token, an expert pastry chef is hardly likely to enjoy cooking ready mix sponge cakes.
If managers are to make all the important decisions, this also implies the need for a large number of contingent decisions, in the form of rules, which subordinates are willing and able to draw on as circumstances change. It imposes a rigidity which is undesirable when managers are faced with making decisions under what Ansoff (67) has described as conditions of partial ignorance. No matter how good the information system, no-one can be completely sure of predicting the future with accuracy. Some flexibility is necessary in all organisations, to take into account the working of chance effects. Ansoff argues for a means by which a system of objectives may be established so as to allow for unforeseen events. These factors tend to act in favour of a wider range of discretion at lower levels, in the expectation that when faced with a decision, workers or managers will recognise that their interests broadly correspond with those of the organisation.

It would appear that this underlying trend of moving from a centralised to a decentralised structure is also reflected in the way that computer resources are made available. Two decades ago when the purchaser of a computer was using a rule of thumb of £1 per byte of main memory, machines were big and very expensive. The huge investment which they represented had to be located centrally so that, used on a batch basis, it might be employed as intensively as possible. Batch based systems are inconvenient and slow but they do lead to high machine utilisation.

Nowadays, a byte of main memory costs less than 1p and the trend is towards networks of small computers which may be back-ended by a larger processor. Conventionally, small computers are used to front-end bigger machines, that is, they organise the work so that the big machine is used more efficiently. A back end is a reversal of this position, the large machine is used perhaps to organise a set of files shared by a number of small machines or to handle large jobs. Many administrative jobs today, perhaps even most of them, can be carried out on the small computers located in every manager's office. The current term for each small computer is a work station or a user station and this describes it very
Each manager is able to use the power of his own work station to attack a problem, without reference to any other user. If a bigger machine is needed, the job is loaded down the line to the back-end, which returns the answer to the local work station when it is ready. This kind of approach is fast, convenient, powerful and cheap.

How then does this technology disturb the underlying social and cultural theme of a devolved, democratic and above all decentralised decision making structure? One of the most well remembered commentators on the topic of new information media was Marshall McLuhan (68). Writing about television, he argued that this medium would offer the prospect of turning the world into a "global village", linking together those who could and those who could not read. Since Gutenberg and the invention of printing, a form of intellectual order had been imposed by the linearity of printed material. Television would impose no such constraints. Unlike a printed page or even a radio broadcast, there was likely to be a high level of audience participation in the medium itself. It was what McLuhan termed a "cool medium" and as a result it would sweep all before it. He emphasized that a new information medium should never be regarded as simply an addition to an old one and that it does not just leave old media intact. It oppresses and changes them until they are forced to find new shapes and positions.

The interaction between a computer and a user is even more participative than that of television and an impact that is correspondingly powerful might therefore be expected. Information technology is indeed changing and supplanting the old and structures must change as a consequence. McLuhan's global village is a view of a decentralised world, Simon tends to see things rather differently.
"The computer is making major contributions to raising the level of expertness (sic) in decision making on complex matters. It is doing this however, not by concentrating the decision process at higher levels of management but by either (1) facilitating the construction and use of system models that can incorporate system structure and system behaviour or (2) permitting the assembly of expert knowledge in large data banks that can be consulted readily from any organisational location . . ." (69)

In other words, the centralisation of decision taking is implicit in the way that the system is designed and design in this case, is the key word.

From the analysis presented earlier it would seem that the hospitality industry still has important choices to make. Given the choice between managing the logistic or the human side of enterprise, the service industries have tended to come down far too heavily on trying to manage outcomes, to standardise performance, by working through people. The new technology makes a different balance of effort possible and allows for what Levitt has called a production-line approach to service (70).

This approach has already been adopted by the fast food companies which have been successful because they have, among other things, shifted the emphasis away from operational managers to planning managers. The layout, the equipment, the procedures and the training all integrate to ensure that the easiest way to do a job is to use the method that was planned by the company. Quite simply, the easiest and most convenient way for a cook or a waiter to work is the way in which the planning manager wanted him or her to work. As an additional safeguard, more intelligence, in the form of microprocessors, is built into the operating equipment. Even if the restaurant is staffed by a semi-skilled, transient, largely disinterested work force, food quality does not suffer. Management control is built into the design, there are no inspections by sous-chefs on the hot plate in a fast food restaurant. The emphasis for the control system is in directing behaviour to a performance before the event, not afterwards.
To some extent it is a psychological question as to whether such moves are perceived in terms of centralisation. Certainly, the role of the middle managers may change. There could be an even greater emphasis on an operational role. This does not necessarily imply that all initiative will be taken away and that all decisions will be made at the centre. Take for example, the task of preparing marketing plans. On the one hand it is desirable to prepare these at the centre to provide for essential co-ordination between activities. On the other, an input at department or unit level is desirable to take full advantage of expert knowledge of local conditions. If the preparation of plans is controlled through a computer, it is possible to have the best of both worlds. Given the framework of a corporate financial planning model, the unit manager is able to construct a marketing plan. Prompted by the computer the necessary data are considered more rigorously, since every aspect of the plan has to be thought about. Constrained by the computer model, departures from policy are contained; it is not possible for the unit manager to boost profits by using too few staff or by paying low wages for low grade labour because the computer is programmed to limit such intentions. Nevertheless, inputs are made at local level and take account of local conditions. The unit or the departmental manager can be committed to the plan because they were involved in its production and may feel a sense of ownership. The dichotomous need to centralise for co-ordination and thus make effective use of scarce expert resources, yet to decentralise so as to avoid dysfunctional behaviour, is completely supported through the deployment of a computer based procedure.

3.1 Summary

Technological change in the form of increased application of decision support systems based on small computers is of particular importance in an industry which can trace its existence over such a long period. The hotel and catering industry may be thought to have retained many of its fundamental characteristics over this period. Given the survival of organisations within the industry it is certain that they have developed,
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partly so as to meet changes within the environment and partly to meet the needs of coalition members. The initiative for successful change is expected to come from high level managers. In a service industry technology may affect the nature of the service provision having effects over and above those structural changes needed to cope with the technology alone. As a result, the role of middle managers and the relationship of middle managers to high level managers may be affected substantially. It is therefore of interest to determine the perceptions of managers in relation to this technology and to attempt to determine the extent to which consequences are envisaged or predicted.
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CHAPTER 2

Organisation Structure, Technology and Innovation

1 The Nature of Technology in Organisations

1.1 Definitions of Technology

Almost since the inception of management theory as a distinct knowledge domain writers have been concerned with the impact of technology on organisations. One of the earliest acknowledged management theorists was Frederick Winslow Taylor. Most general texts on management acknowledge the importance of Taylor's work as the father of scientific management, by which he meant the application of scientific methods to industrial practice. The implementation of his methods had remarkable effects, particularly on the operating costs of the United State's Bethlehem Steel Company in 1898. They also had remarkable effects on the people who had to work with them. The instruction below is extracted from Taylor's own report of a conversation between himself and a "little Pennsylvania Dutchman" named Schmidt, chosen as the first exponent of the scientific method.

"... you will do exactly as this man tells you tomorrow, from morning till night. When he tells you to pick up a pig* and walk, you pick it up and you walk, and when he tells you to sit down and rest, you sit down. You do that right straight through the day. And what's more, no back talk. Do you understand that? When this man tells you to walk, you walk, and when he tells you to sit down, you sit down, and you don't talk back at him." (2)

"(a piece of pig iron)

Not surprisingly, Taylor's technological model of a human machine that would load railroad trucks with pig iron in the fashion of a modern robot, led to some adverse reactions from the workforce. In 1901 Bethlehem Steel, concerned for both its industrial and its community relations, dispensed with his services. After a later implementation of the method at the Watertown Arsenal which resulted in a strike, the American Congress actually banned Taylor's methods in its defence industry in 1914. Taylor
regarded his method as suitable for "stupid, unskilled, phlegmatic men with the mental make-up of an ox".

Curiously enough Taylor’s notions were not consigned to the dustbin of history. The same highly programmed approach was used by NASA for the carefully trained, intelligent astronauts of its Skylab project. The sequence and timing of each activity on the mission was tightly scheduled. No two experiments were allowed to conflict, idle time was eliminated and even meal breaks were cut short. The scheme fared no better than that of its progenitor. It was abandoned after the first sit-down strike in outer space in December 1973. (3)

It is unlikely that Taylor would actually have regarded his method as a technological factor which affected the behaviour of an organisation. As Winner (4) has pointed out the term ‘technological’ had a specific, limited and unproblematic meaning in the eighteenth and nineteenth centuries. Winner suggests that technology was not in fact a word in common former use. People would have spoken directly of machines, tools, factories, industry, crafts and engineering.

Nowadays technology is a word of some importance and is used in both ordinary and academic speech to connote a diverse collection of phenomena. Indeed, Winner argues that the term has become so all encompassing that it threatens to become meaningless and he proposes a scheme based on three broad but distinct usages.

a) Technology as apparatus is intended to refer to tools, gadgets or physical devices (probably the most common conception of technology).

b) Technology as technique includes skills, procedures or routines to achieve a purpose related to specific goals.

c) Technology as organisation describes social structures which are created to achieve technical, rational productive ends.
A distinct recognition of each aspect of the term is helpful when attempting to distinguish the elements of problems affected by technology. The application of the definitions is quite difficult in practice however since it is clear that many writers use the term in a less precise way and that in any case each of these elements is very closely linked. Thus Perrow defines technology as;

"... the actions that an individual performs on an object with or without the assistance of mechanical devices, in order to make some change in that object." (5)

This is a definition that applies very well to Taylor's work. Woodward on the other hand is more concerned to introduce apparatus. Thus she has it that;

"The specific technology of the organization is, then, the collection of plant, machines, tools and recipes available at a given time for the execution of the production task and the rationale underlying their utilization." (6)

More recently however Pugh and Hickson present a definition that encompasses all three elements. To them, technology is;

"... the sequence of physical techniques used upon the workflow of the organization... the concept covers both the pattern of operations and the equipment used." (7)

The recursive nature of some of the definitions used by researchers for the term 'technology', leads to difficulties which are evident when the results of their work are studied. In essence many studies attempt to plot the impact of what Fox (B) calls "material technology" on what he calls "social technology". His terminology is not too dissimilar to Winner's. Material technology can be seen, touched and heard while social technology seeks to order behaviour and relationships in purposive ways. Given the extent to which technology straddles these two areas and the differing levels of meaning which the word acquires, it is unsurprising that research findings are sometimes contradictory. Findings must therefore be treated with great caution. Not only must the exact meaning of the word be examined in context but the benefits of hindsight are often
useful in helping to decide which is the dependent and which the independent variable in the subject under study.

1.2 Organisation Structure and Technology

The interweaving relationships afforded by technology as materials and technology as social organisations have been studied extensively on the basis of two major thrusts. A quantified analysis, based more or less directly on measurements of technology and structure, has been favoured largely by sociologists. By this comparative approach the organisation is treated as a whole unit and little explicit consideration is given to whatever structural or technological diversity exists within it. The dominant form or process is usually taken as the basis of the study. Attributes such as degree of complexity, centralisation, formalisation and work flow integration (the extent to which technology is automated and specialised) are quantified in some way. Co-ordinates are then recorded to define the extent to which some feature is present or absent and the method proceeds by pattern seeking techniques such as correlation and linear or curvilinear regression.

The methods employed are strong on empiricism and explanation though less fruitful for the development of new insights since they tend to concentrate on finding existing patterns of relationships. The research of Woodward beginning in 1953 and subsequently (9), in the 1960s the work of Hage and Aiken (10) and the Aston group lead by Pugh (11), and in the 1970s the National group of Child et al (12) and that of Blau and Schoenherr (13) serve as examples. To some extent Burns and Stalker (14) and Perrow (15) could be classified here though some of their work presages an alternative approach.

Systems theorists on the other hand, tend to presuppose that an organisation cannot be understood without specifying the relationship between components. This more descriptive approach is favoured by those who see organisations in terms of socio-technical systems of which structure and technology are interdependent aspects. Organisations and departments are categorised as having varying degrees of differentiation and integration so that they can each perform their specialised tasks more effectively. Such specialisation has the effect of fragmenting the
organisation so that some technique is needed to integrate the different roles and link them together.

Protagonists of this method make little or no attempt to measure aspects of technological or structural dimensions and then relate them using statistics. Conclusions are drawn mainly from case studies often applied to one organisation at a time. The emphasis lies in devising new organisational relationships rather than attempting to explain old ones. The work therefore tends to be rich in insight but normative and empirically weak.

Formative work in this field might be cited as that of Chappie and Sayles (16), Lawrence and Lorsch (17), and Miller and Rice (18) in the 1960s. More recently Mintzberg’s (19) work in the late 1970s might be categorized in this way. Mintzberg proposes a view of organisations based on components, with a small strategic apex at the top, an operating core at the bottom and, in between, modules that he labels as middle-line managers, the technostructure and the support staff. This contrasts markedly with the view of a single main dimension with a structure determined by size or technology. Whilst it complicates both conceptualisation and the research process, in the long run it may prove to be a useful hypothesis for the formation of models.

The method can be seen as complementary to that of comparative analysis and both methods have something to offer. A sociological approach can be used to measure existing attributes and systems design can be used in the context of organisational development to move to some new, preferred state.

1.3 A Summary of Organisational Findings

The published findings of the more influential theorists who have proposed explanations for the shape and nature of organisation structures are generally well known and it is not proposed to review their work in detail. In any event, the organisational effects of innovation in the form of material technology are of greater interest to this study. A brief consideration of some of the more formative propositions may help to identify the main forces which are reckoned to interact with and affect
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the adoption of material technology. Such intended brevity necessarily incurs penalties. The lack of a full discussion may fail to elicit the precise aspect of technology that was being considered, material or social. However, for the purpose of describing elements of the problem, the approach is considered to be adequate.

Woodward's early work intended to look only at line-staff responsibilities but found that a broader investigation was needed to make the distinction meaningful. She noted that,

"the appropriateness of an organisational structure must be the extent to which it furthers the objectives of the firm." (20)

This is very close to Drucker's more contemporary definition.

"Structure is a means of attaining the objectives and goals of an organisation." (21)

In order to compare objectives and structure she categorised organisations according to the technology that they used. By technology she meant principally methods of production. The study that she carried out is widely regarded as a classic of its type and is important to this discussion in establishing an initial link, that between technology and structure. In passing it is interesting to note two features of the work. The first is that only the dominant process was taken into account when categorising an organisation and that firms with more diffuse production methods were discarded from the sample frame. The second is that whilst Woodward studied one aspect of the problem she may, inadvertently have measured another. Her conclusions suggested a link between technical complexity and structure. More successful organisations being closer to the mean for their technology group than others, especially for small firms. However, it is not unreasonable to suppose that larger organisations would in any case be more complex. It is likely that they would contain a higher proportion of specialist groups and a larger number of staff and administrative functions.

Attempts to confirm or confound Woodward's findings, of which there are many, have frequently discussed the second major variable which is that of size. The case for an association between size and organisation structure
is strongly established by a number of studies, such as that by Hunt (22). However, a consensus over the exact relationship between technology, size and structure is difficult to establish. Technology may cause structure which in turn causes size as Aldrich (23) has argued in support of Woodward. Thus firms using technologically sophisticated processes, principally highly automated manufacturing companies, tend to have more specialised functions. Relationships between these functions have to be defined formally and this in turn leads to greater decentralisation. A high degree of specialisation and formalisation implies a work force of a certain size.

The notion that technology determines both size and structure is not confirmed by other studies. For example, Blau et al (24) found that with size controlled, technology lost much of its performance as a predictor of structure. Again some insight into the method is of passing interest. Simple linear correlations did not support Woodward whereas curvilinear correlations produced strongly supporting evidence (Woodward herself used both). Blau also seems to show that better results are obtained using wide measures of automation or mechanisation. Thus it may be that size and structure interact directly with each other, either in conjunction with or independently of technology.

The studies which seem to offer least support to technological determinism are those carried out at Aston University described by Pugh et al (25). Using eleven principal variables and, all told, 132 scales they examined both the context in which an organisation operated and its structure. Contextual variables defining the situation outside the organisation included such items as, origin and history, nature of ownership, size, type of goods and services, technology and vertical integration. In this case technology was defined as work-flow integration referring rather narrowly to the number of continuous, automated processes. Structural variables described activities internal to the organisation and included measures of role specialisation, standardisation of procedures, formalisation (the existence of written rules), centralisation (concentration of authority at the top) and configuration in terms of the chain and command and the number of support personnel. Pugh has suggested (26) that the contextual variables described account for over fifty percent of the variation between organisational structures. This is
probably optimistic in view of the frequency with which research findings in this area disagree with each other. Besides, as Blackburn (27) has observed recently, the research base to date is far too limited to justify broad generalisations.

In one sense at least, the ideas of the Aston group are consistent with the others that have been mentioned. Structure is seen to result from some functional imperative such as technology, size or context. The latter may be redesignated more conveniently as environment. However the findings are far from conclusive. This is partly due to poor definition of variables making comparison and assessment difficult. For example, Blau and Schoenherr's (28) measures of explicitness based on the number of computers and input/output units may coincidentally be measuring size. Work flow integration was narrow in scope and was based solely on the predominant manufacturing technology. It may therefore be more a measure of service or manufacturing orientation.

This may be important since most of these theories have been developed with manufacturing industry in mind and there is little evidence to support the idea that findings can be translated even to different industries of the same sort. There is thus little incentive to believe that they can be transferred to service industries such as hotel and catering. Finally, McKelvey (29) has questioned the extent to which many studies have obeyed systematic principles for creating an effective taxonomy. Though in a later research note with Warriner and Hall (30) he also accepts that an overriding taxonomy may be difficult to develop, hard to comprehend and progressively less easy to use as it became more detailed.

Management and Organisation Structure

In the first chapter it was suggested that to treat organisational development as other than purposive was somewhat barren from a theoretical point of view. To depict the role of managers in the determination of organisation structure as mainly passive, merely reflecting the pressures and dictates of forces within and around their sphere of operations, may be equally fruitless. Yet such is the scene that has been reviewed so far.
Interestingly enough, the framework for an alternative approach was laid by another early definitive study of structure, linked to innovation. In 1961, Burns and Stalker (31) reported some observational studies of twenty British manufacturing firms. Their findings led them to investigate why firms could be equally successful when using highly differentiated management styles. On the one hand they were faced with companies using highly bureaucratic, rigid structures which according to contemporary management theory should have lead to worker discontent and inefficiency. On the other hand they were faced with companies which seemingly violated every principle of classical management with low formalisation, little standardisation and even relatively low levels of personal interaction. The first type of organisation, characterised by high specialisation and a rigid, well defined hierarchy, they labelled mechanistic management. The second, based around a fluid definition of roles, they labelled organic management. The former is seen as appropriate to stable operating environments while the latter is put forward as more appropriate to conditions of uncertainty and instability. Thus the question of management style in relation to environmental conditions is introduced.

Emery and Trist (32) developed these ideas in 1965 by categorising environments according to the rate of change and type of competition. Thus a placid-random environment was stable and unchanging, a placid-clustered environment was one where some of its parts were related to each other and where the organisation adopted some form of internal specialisation, disturbed-reactive environments contained several competing organisations and offered the possibility of co-operation or competition and turbulent environments presented conditions of volatile change.

In 1967, it appeared to Lawrence and Lorsch (33,34) however that even organisations similar in size and using similar technology to trade in similar markets, sometimes adopted different structures. On considering that some structures appeared to be preferable to others in terms of performance and success, they proposed two concepts. Differentiation was the degree to which the tasks of individuals and groups could be divided. Integration was the required level to which units should be linked together and their degree of interdependence. The two concepts are
inversely related since highly differentiated units cannot be easily integrated.

Writing contemporaneously, Thompson (35) actually categorised three possible integrative mechanisms. The first is integration through standardisation, which channels the actions of each job holder by a system of rules. The second is integration through planning, a more flexible approach since plans can usually be modified. The third is what Thompson called integration through mutual adjustment, achieved through people modifying their actions as a result of direct exchanges of information. Quite a wide range of integrative mechanisms would fall into this last category. Thompson also observed that the creation of rules by those having power was sometimes a way in which they maintained their position. Both the nature of integrative mechanisms and the notion of organisation structure as a control mechanism were taken up later by Shamir (36) in his study of the organisational characteristics of hotels.

A hotel or catering organisation is characterised by different technologies and even different operating cultures within the same unit. Manufacturing and maintenance areas such as kitchens, plant maintenance and heavy duty cleaning departments assume a character quite different from customer contact service areas such as dining rooms, reception or even administrative departments like marketing and sales. According to Lawrence and Lorsch this condition would typify a differentiated situation in which different structural forms operate within the same organisation. Form being determined by that particular environment in which the operating sub-unit finds itself, selected according the likelihood that the chosen structure will cope most effectively.

In the early 1970s the prescriptive limitations of conventional organisation theory were becoming increasingly evident. In a piece entitled, "The Short and Glorious History of Organisational Theory", Perrow asked the question,

"to what extent are organisations tools, and to what extent are they products of the varied interests and group strivings of their members?"

(37)
His question was answered by several writers. Silverman took the view that,

"an organisation is itself the outcome of the interaction of motivated people attempting to resolve their own problems." (38)

In other words, people make the organisation and consequently the relationship between organisation structure and technology is a reflection of choices made by managers (and workers) based on their perception of the situation. Beliefs, expectations, selection of goals and identification of policies will all constrain behaviour and influence purpose. By contrast to technological determinism therefore analysts such as Child increasingly see organisations as largely political contrivances, the design of organisation structure being,

"an essentially political process in which constraints and opportunities are functions of the power exercised by decision makers in the light of ideological values." (39)

This view is labelled variously as strategic systems theory or strategic choice. At the job level, Silverman saw it as a way of analysing the social relations within an organisation (40). Taking Silverman's term of 'action approach' and redesignating it as a theory, Bowey (41) presented an interesting analysis of five restaurants based on case studies. She suggested that because the relationships of members of an organisation were unstable over time, then the structure adopted by that organisation was necessarily transient. Any structure existing for as long as perceptions of objectives were mutually shared by participants. Various actions by members contribute to the process by which structure may be changed or preserved. An organisation is thus perceived as a constantly changing set of roles, relationships and structures. Organisation members create and recreate structure via their interactions with each other. By this model, organisations actually design themselves. In fact, to go back to the example of the Skylab astronauts given by Weick (42), the solution to the astronauts' strike proposed by the men themselves was simply that they be allowed to organise themselves, given a list of experimental research to carry out.
To some extent, organisations are inevitably self designing structures. Designs imposed from outside cannot possibly anticipate the nature of problems that must be solved from within. (43) In any case, people rarely follow the exact design intended for them by others. (44) Their own interests and beliefs influence the shape that the organisation adopts and even the tasks that it undertakes. By this argument, technology cannot determine structure independently. To clarify this idea Child (45) produces a useful distinction between two aspects of structure. Basic structure is concerned with the behaviour that is expected of organisation members and is reflected in, the allocation of tasks and responsibilities, the formal reporting relationships and the methods of achieving coordination. Operating mechanisms focus more on methods for motivating organisation members, delegating authority and trying to ensure that everyone strives for the same goals. Staff appraisal, training and development would be examples of such mechanisms.

From this it is suggested that organisations be viewed as complex systems consisting of five mutually dependent parts. Technology, structure, size and strategies all interact within the context of an environment. Strategies may be concerned with personal objectives or with those of the organisation. Thus to understand the impact of technology on organisations it is necessary to consider the nature of the decision process by which it was applied. Argyris (46) noted in 1972 that leadership style, technology and structure have actually been studied very little in conjunction.

For all the differences of methodology, emphasis, definition and terminology, writers on the issue of organisation and technology share the same basic constraint. They are first and foremost concerned with organisations and deal with technology as an explanatory, exogenous, independent variable. This constraint is common to almost all the studies in this field, irrespective of their preferred method of approach. There appears to be no necessary reason in many cases why a particular form of technology should be associated with a certain structure. Much of the literature seems to take this as self evident but the mechanism or process by which such moulding takes place is nowhere explained. Indeed, the contrary view is more easily sustained. Many organisations actually shape their own technological environment either by choosing those types
of technology with which they wish to work or, in the case of large organisations, generating it endogenously from research departments or via sponsored research.

From this position, organisation members and management in particular, would seem to have considerable discretion in choosing how structure may respond to forms of technology. Thus, writing in 1986, Wainwright and Francis (47) suggest a number of elements which may influence the relationship between technology and organisations. These include, the degree of skill required by the instrument or machine, the degree of sophistication of the operation, the diversity of the technology used, the rate of change of the technology and the degree to which the technology may be subject to automatic controls. It is therefore reasonable to hypothesise that it is not the technology but the way in which it is used and perceived that may have the greatest influence on the determination of structure.

3 Management and Technological Innovation

The preceding argument rather begs the question as to how an organisation might best structure itself to cope with a changing environment. The process described by Hedberg et al (48) for coping with a complex environment seems to represent something of a counsel of perfection. Based on a series of compromises which avoid extreme positions they labelled their suggestions as "flyable seesaws". By this scheme there is minimal commitment to consensus, planning, internal rationality, consistency and even minimal belief in the organisation's own plans. Such a stance is meant to make it easier for the organisation to reconfigure itself according to current operating environments. Despite the attractions of such a fluid, moderate condition it seems reasonable to suppose that from time to time organisations will adopt some specialised form in order to maximise their competitive advantage in the light of current conditions. The risk attached to organisational specialisation being that the structure adopted at one stage of a life cycle may be unsuited to some future environmental state. Thus there may be a conflict between the requirements of a medium and a long term configuration. (49)

Yet environments are changing, particularly those associated with
computers and information technology. The rate of change is such that under the classification used by Emery and Trist the current environment would doubtless be described as turbulent. The pressure to adopt technologies based on microelectronics and adapt organisations accordingly, is very strong in the United Kingdom (50). For example, Buchanan made the following observation based on a report of the British Advisory Council for Applied Research and Development.

"It is widely assumed that we must employ new information and computing technologies to remain competitive in world markets. It is generally accepted that, because microprocessor technologies are widely applicable, faster, smaller, cheaper and more reliable, their application will be inevitable, rapid and beneficial." (51)

Technological innovation is often regarded as being central to corporate development in both commercial and non-commercial organisations in capitalist societies. Keeping up with the times, or with the Jones's, is a popular aphorism. The underlying thrust of most literature on the topics of innovation and change implicitly equates managerial innovation with progress. Since it is unfashionable to be against "progress" then the literature tends to concentrate on how change might be facilitated and how resistances may be overcome.

There is a wealth of advice on this topic. Subsequent to Argyris's concern in 1972, a review of the literature on technological innovation alone, carried out in 1978 by Kelly and Krantzberg (52), yielded some 4,000 items. A pro-innovation bias in the literature is probably consistent with the underlying value system of Western society following the economic regeneration necessary after World War II. The social upheaval and structural changes which evinced themselves more overtly in Western economies during the early 1980s and subsequently, may very well lead to more balanced positions. However, adaptive strategies which involve rejecting innovations are uncommon in the research literature, as are references to educational and structural strategies designed to screen out managerial innovation. Since the adoption of technological innovations, particularly those based on electronics and telecommunications, advances rather slowly in the hotel and catering industry it might be presumed that such strategies are better known to
practising managers in these industries than to researchers.

In common with the term technology, there is some debate as to whether the word innovation implies a product or a process. Without rehearsing the arguments presented at the beginning of this chapter a similar line of reasoning might once again lead to the conclusion that both are implied. Very broadly, Rogers and Shoemaker take this view.

"An innovation is an idea, practice or object perceived as new by an individual. It matters little, so far as human behaviour is concerned, whether or not an idea is objectively new as measured by the lapse of time since its first use or discovery. It is the perceived or subjective newness of the idea for the individual that determines his reaction to it." (53)

By defining technology as a design for instrumental action, Rogers and Shoemaker neatly avoid the need for greater precision. In their studies, new ideas involving both technical and social change are taken merely to be illustrative of the socio-technical character of some organisations. This is unfortunate since the nature of technical and social interventions differ in some important respects. Not least of these is the fact that technical innovations are more predictable and more amenable to direct measurement. Thus to change the printer attached to a hotel front office computer is to produce some alteration in the speed and style of printed reports which bear objective comparison with those previously produced. To change the procedures by which a report is considered by management is both a more ambiguous and less controllable process, the outcome of which is far less easy to quantify objectively.

A concept of innovation as a significant departure from the state of the art is probably acceptable. Writers such as Kelley (54) have argued that by minimising perceptions of newness, innovations may be introduced into organisations with less difficulty. Less radical change is thought to be less threatening and it will be shown later that strategies of this sort are not uncommon when microprocessor based products and computer based procedures are introduced to managers in the hotel and catering industry. Strictly, the word itself is derived from the latin, innovatus, which means to renew or to make new again. Thus it is perceptions of newness by

P.R. Gamble
potential adopters which are likely to affect the rate at which innovations diffuse. Independent criteria to determine newness objectively are not considered to add very much to an investigation affecting receptivity. A great deal of work in this field, including some of that of Rogers and Shoemaker, has actually been carried out by studying the way in which peasant communities adopt basic hygiene practices or simple agricultural techniques.

Consistent with the earlier sections of this chapter, it is difficult to escape the conclusion that amongst factors which may affect the introduction of technological innovation, the conditions created by management within the organisation will have a major influence on its impact. Thus it has been argued that the role of managers in the innovation process is critical. (55) This may well be because many writers are agreed that invention, diffusion, adoption and implementation of innovations are all viewed as processes. One reason given for the relatively slow rate of diffusion of innovation generally in the United Kingdom has been given as the quality of management. (56) Thus the way technology is introduced and its subsequent effects may be seen as a function of the intentions, goals, assumptions and values of managers. As Watson points out,

"Developments in technology may have massive implications for individuals and for society at large. Those implications only arise when people choose to adopt them and apply them to achieving human ends. Technology is no force in its own right. To talk of the 'iron hand of technology' is to avoid the important and necessary question of who is applying technology and to what ends." (57)

3.1 Some Factors Affecting the Successful Adoption of Technological Innovation

In view of the pro-innovation stance of most literature, it is somewhat salutary to draw the broad parameters for the adoption of innovation from a study which takes failure into account. In 1967 the United States Airforce decided that if they examined situations into which innovations had been introduced and identified what had succeeded and what had failed, they might be able to isolate those attributes critical for success. Their findings were published in a report entitled, appropriately, Project...
Hindsight. Their conclusions describe four critical factors. (58)

The most important of these is perceived need. There is no objective criterion for measuring the need, it is based on perceptions. Inventors have presented the world with automata over the last several centuries, there is even a reported instance of a mechanical android in the thirteenth century. However, it was not until labourers were forced to perform machine-like tasks (such as those devised by Taylor) in the late nineteenth century, that industrialised society perceived a need for robotics and computer aided manufacture (CAM).

The second critical factor was the availability of an appropriate technology for addressing the need. In 1936, Chaplin's famous film, Modern Times, sought to point out the effect of machine paced work and production line manufacturing methods on the people who had to operate them. However, it was not until the end of World War II that the appropriate technology began to emerge. Advances in solid state electronics and digital logic provided the mechanism but more time was needed to provide a cadre of scientists and technicians able to exploit them.

The third criterion was put forward as financing and might be more appropriately generalised under the heading of resources. In practice this criterion probably conceals an underlying need for a management attitude which might be labelled by the epithet conviction. Pursuing the example of computers and robotics, it might be argued that it was not until the early 1950s that organisations felt themselves sufficiently recovered from the effects of World War II to assign the necessary resources for the development of commercial computers and robots. At the same time, differences between the resource base provided in Japan and the resource base provided in the United Kingdom can be traced partly to differences in commitment, which stem from different systems of belief. A well known hotel and catering company, J. Lyons Limited, was at the forefront of the development of commercial computers in 1951. It manufactured the LEO (Lyons Electronic Office) Mark 1, one of the first commercial computer systems in the world. However, it later sold its interests in the technology partly because of a lack of management conviction concerning the commercial potential of the development.
Venture capital markets are an excellent and frequently used source of finance for the development of innovations in this field but these are recognised as only one part of the solution. The most important part being that of "good" management. (59)

The final criterion identified by the US Airforce study was that of timing. Timing implies a certain cultural receptivity illustrations of which proliferate in the history of product innovation. To take one well known example, Da Vinci's invention of the parachute somewhat preceded the emergence of the aeroplane.

Prescriptions for the introduction of innovation are probably best treated with some caution. They may tend to suggest a balance of power, a communication process and a shared consensus that is feasible neither in organisational or cultural terms. (60) Certainly such rather comfortable visions of co-operation and mutual concession do not conform to Hedberg's prescription of an adaptive organisation as a "flyable seesaw".

Dore has suggested (61) that both cultural climate and internal structure predispose an organisation to be innovative. He proposes two scenarios for creating conditions conducive to innovation, the market model and the community model. In the former, he argues that members of an organisation will bargain with each other largely from a stance based on material self interest. These may be seen as the temporary coalitions described by Pfeffer (62) and Wilkinson and Kipnis (63). By contrast, in the community model the major purposes of the organisation are purposes to which all members of the organisation subscribe, even to the extent of allowing these collective purposes to supersede their own private needs to some degree. The former he posits as more representative of the situation in the United Kingdom or United States, the community model he considers more descriptive of the Japanese approach.

The key issue for hotel and catering organisations is not so much invention but adoption. Perhaps given its long historical connections it is not noted as a great source of innovation. A considerable proportion of innovation research examines the characteristics of adopters at the individual level, Rogers and Shoemaker categorised nearly 60% of innovation studies in this area (53:72). These generally take the form
of identifying a certain innovation and then studying the reactions of adopters in the context of a social system. Some characteristics of individual adopters will be discussed below.

Managerial innovation requires consideration in a broader sense because it is meant to be adopted by organisations. If a peasant is to decide whether or not to boil drinking water, few people have to be consulted. If a hotel is to decide whether to introduce a computer for its reservation system then many people and many coalitions must either support and accept it or, minimally, agree not to resist it. The problem may therefore be seen as more complex. In examining variations in the pattern of managerial innovation, four variables appear to be of interest.

The first of these is the character of the administrator and the character of members of the organisation. In this sense character implies power relationships (which will be examined in chapter 4) as well as primary temperamental qualities (personality). Thus both Kaplan (64) and Mytinger (65) reported that leadership style, professionalism and cosmopolitanism correlated positively with organisational innovation. In this context, leadership style should be understood in terms of commitment rather than in terms of an orientation to people or tasks. Since these reports are either contemporary to, or pre-date some important work in the area of leadership styles it is useful to find that Kazlow (66) provided further insight into this particular variable in 1977 nearly ten years later. His findings suggest that both commitment and organisational stature, rather than personality, are of key importance.

The character of managers in the hotel and catering industry does not lend itself easily to objective classification. That they are highly cosmopolitan may be verified on the basis of casual observation. In both sectors this is true both for multiple work group membership and for widespread ethnic background. There is a high proportion of non-indigenous employees at both operator and management level. Professionalism, if measured by proportion of managers with formal qualifications, would tend to be low. The ETAC findings reported in chapter 1 (67), indicate that only 10% of full time employees hold a supervisory or management qualification. Contact with the professional institute of the industry, the Hotel, Catering and Institutional
Management Association (HCIMA) reveals that membership has remained at just over 20,000 for several years. Given that some 5,000 of these members are working in education, mainly as teachers, the proportion of the 200,000 or so managers counted in the ETAC study who seek to connect themselves with a profession is also low. The commitment and attitude of these managers to innovation is subject to further investigation in this study.

The second major variable pertaining to managerial innovation would seem to be organisation structure. From their early work, Burns and Stalker (68) found that innovation is adopted most easily in organic forms of structure where there is low formalisation, low centralisation and widespread internal communication. They suggest that the receptivity to innovations is enhanced in conditions where there is little routine behaviour and few set procedures. However, later work by Corwin (69) appears to contradict this position. Corwin found that innovations were imposed more easily on organisations with more formal and bureaucratic structures. It would appear that the two positions can be reconciled when relationships with the external environment are taken into account. If environments are relatively stable then formalisation and centralisation may be an appropriate form whereas the contrary would be the case in a turbulent environment. In effect, this is to restate some of the conclusions of Lawrence and Lorsch (70) and reconciles with strategic systems theory.

The effects of organisation size are not easy to demonstrate. It might be expected that small organisations or organisations divided into small, specialised groups might be predisposed to seek and adopt innovations more rapidly. Certainly in the microcomputer industry, most innovation between the period 1976 and 1981 came from relatively small companies. Large companies seemed unable to respond flexibly and rapidly enough to the changing needs of the market. By contrast, it might be expected that larger organisations were more immune to risk and might therefore be prepared to adopt innovations which did not threaten their overall position. This equivocal position is rather supported by a comment from Utterback who concluded, from a review of the literature that,
"there is no evident relationship between firm size and speed of adoption of innovations." (71)

However two useful observations can be drawn from a paper prepared by Kimberly (72). Taking hospitals as his example he suggested that (once again) it was commitment in the form of resource commitment which may be an underlying determinant. Where an organisation has prior commitments in an area for which an innovation is relevant, large size enhances adoption. Where there is no prior commitment, adoption is hindered. In comparison, small organisations found it easier to negotiate for innovations even where there was no prior commitment because more informal, widespread access to administrators facilitated the process. It might therefore be expected that a hotel or catering organisation might be more or less predisposed to adopt an innovation according to its relevance and in terms of resource priority.

Thus a hotel company might well adopt a computerised front office system if other competitors were already doing so. Given a resource commitment in this area, clearly a larger company could proceed at a lower level of risk. Similarly, cost pressures in the National Health Service may have been one factor which affected the adoption of the computerised Catering Information System (CIS) discussed in chapter 8. It is difficult to categorise hotel and catering as either knowledge pull or technology push industries. The explanation that has been offered fits more comfortably with Nystrom's (73) distinction between positional and innovative companies. Innovative companies take the view that the future is uncertain and changing and assume a posture accordingly. Positional companies operate in what they perceive as stable environments, they eschew change and adopt innovation reactively in response to their operating environment. Most crucially, Nystrom overlays these categories with a notion of latency, related to organisation size and innovative orientation. A small organisation with an unclear innovative orientation is classified most centrally as positional. Basic orientation may be changed and innovative potential increased following a change in top management.

Clearly, any company involved with microelectronics would be foolhardy to take any but the former stance. As potential adopters, hotel and catering
companies are difficult to categorise as anything other than positional, a view that is reflected by some of the interviews carried out for this research. Whilst it may appear curious to take an unchanging view of the world at a time when the pace of change appears to be increasing, the fundamental nature of accommodation and food services with its long historical perspective may offer something of an explanation.

Kimberly's second useful observation concerns a third important variable in determining adoption behaviour, that of relationships between organisations and the environment. Kimberly suggests that organisations which have an active search orientation towards external information adopt innovations more frequently, a process that has also been observed in the diffusion of scientific discoveries. Milo (74), in another hospital study, reported that competition among organisations for scarce resources may foster programme innovation. It is almost certain that an element of resource competition lay behind the adoption of the CIS, in the British hospitals used for this research. Caplow (75), in an early management text, reasoned that prestige organisations may be seen as trend setters for the adoption of innovation. Marketing theorists such as Katz (76) actually described a prototypical model in 1957, seven years before Caplow, in an attempt to explain some aspects of buyer behaviour. Katz suggested that opinion leaders in a community might make useful initial targets for any marketing programme and that they, in turn would influence other potential buyers. In both cases of course, the key problem of identifying the influential organisation or individual, remains. In the case of the hotel industry it would be difficult to identify a clear opinion leader in the United Kingdom. Hospital caterers, being a smaller group only about 1,000 strong, might be influenced by regional catering officers of whom there are only seven, or by each other at meetings of their professional association the Hospital Caterers Association.

The fourth and final variable to be offered is that of environmental complexity. The term itself presents some difficulty as there appears to be no easy method of measuring complexity in an objective way. Once again, the issue must hinge on managerial perceptions. Complexity may be defined in terms of uncertainty, or at least an inability to predict future relationships with the environment in a comfortable way. Such uncertainty may derive from increased competition for markets (possible in
the hotel sector) or change forced from outside (government reorganisation imposed on the National Health Service). Feller and Menzel (77) believe that environmental complexity does make a difference to the rate of adoption and see innovation as a coping strategy under certain conditions. It is possible that some of the Catering Information Systems installed in connection with this research were adopted as a ploy of that sort. Interestingly enough, Kervasdoué and Kimberly (78) reported in 1979 on the adoption of innovation as a device through which groups might vie for political ascendancy in a study of hospitals in France and the United States, though this was not directly related to the catering services of the hospitals concerned.

3.2 Characteristics of Innovations Affecting Adoption

It was noted above that the predominant interest for innovation research appears to have been focused on the innovativeness of members of a social system. In their comprehensive study on the communication of innovations, Rogers and Shoemaker (79) offered an early scheme for broadening the research base. They postulated an approach which aimed to examine the attributes of the innovations themselves, as perceived by members of a social system. In particular they considered that such attributes might affect the rate at which an innovation diffused. Five principal attributes were proposed and although they do contain some interrelationships this was not considered to limit their usefulness as each is conceptually distinct. Some additional insights may be obtained by considering the properties of microelectronics as used in small computers by hotel and catering organisations in the context of this scheme. Note that risk is not offered as a separate attribute because it overlaps with the other five to such an extent. The scheme is not claimed to be definitive but rather succinct and convenient.

Relative advantage refers to the intensity of the reward or punishment resulting from adoption of an innovation. It thus describes the extent to which the innovation can be seen to be better than the idea or product which it supersedes and it may be used to explain why preventative innovations such as new types of insurance diffuse at a lower rate. Their relative advantage is difficult to demonstrate as it occurs only at some time in the future, after adoption. Relative advantage, as perceived by
members of a social system, is seen as being positively related to rate of adoption. However, it is clear that to demonstrate the effect, members of an organisation would have to share an explicit understanding of objectives and possibly values. At one level, a computer based procedure in a hotel can be compared with a clerical procedure for record keeping tasks such as recording reservations or noting levels of inventory. Relative advantage is easily perceived. At another level the relative advantage of computerised procedures for producing management information can only be demonstrated if managers perceive the need for such information. An interesting effect noted in the case studies described later is that support for computer based systems is generally greater at operator level in hotel and catering organisations than at management level.

Compatibility is the degree to which an innovation is perceived as consistent with existing values, past experiences and the needs of the receivers. This attribute has been seized on extensively by sales personnel when presenting new technology to hotels and is used as a technique for diminishing apparent newness. The compatibility of computer based hotel systems with existing manual systems is strongly emphasised by many of the selling efforts. Thus the computer is presented as offering merely an electronic, manual system. To a considerable extent computer applications in hotels are of this type. However, the net effect of this has been to inhibit the development of insights and to limit the extent to which computer based procedures might be used to develop hotel and catering organisations. Compatibility with social values is considered to relate strongly and positively with rates of adoption. It may be postulated that the acceptance of advanced technology at any level into an industry that is seen as essentially inimical to such devices may positively affect the rate of adoption.

Complexity on the other hand is related negatively to rates of adoption. Objective measures of complexity are of course meaningless in this regard. The analysis of cognitive structures presented in chapter 3 seems to confirm this finding in an interesting fashion. Where microcomputer based procedures are widely accepted and used by managers, they are often perceived as being uncomplicated. The reasoning process associated with this phenomenon appears to follow the path that if the techniques were
genuinely complex, they could not be used by a hotel and catering manager. The analogy between being the pilot or the passenger of an aeroplane does not appear to suggest itself to the subjects being interviewed. Ratings of complexity obtained in the survey described in chapter 6 seem to suggest that whilst hotel and catering managers see microcomputers as more complex than less, they do not hold this view to the same extent as other professionals such as lawyers and accountants. This may be a function of understanding or appreciation.

The fourth attribute given is that of trialability. Related positively to the rate of adoption trialability is considered to reduce risk. The importance of managerial innovation as a separate area of study is highlighted by this attribute. Clearly small, inexpensive microcomputers can be tried quickly and conveniently by an individual in a way that was precluded by reason of cost for earlier devices. Thus a manager can use a personal computer for budgeting and planning quite easily on an experimental basis. Reductions in cost and improvements in power and performance make little difference to the trialability of these devices in an organisational sense however. Certainly perceptions of financial risk may be altered but the implications for the work group are similar. The reduced pressure to make a formerly expensive investment successful may actually work adversely against adoption if a work group feels threatened.

The final attribute proposed by Rogers and Shoemaker is that of observability. Innovations which are more easily observed are more easily communicated and this is thought to be positively related to rates of adoption. Thus it might be supposed that the use of computer based procedures in hotel front offices for the purpose of reservations and registration, being highly visible, would be adopted at a greater rate. By comparison, the use of computers for food cost control, being an exercise not seen by any but the most interested visitor, would spread more slowly. In general the proposition holds in this case. The penetration of computerised front office systems in British hotels has been estimated by Gamble at 6% in 1985 whereas the penetration of computerised catering systems was put at 2%. (80)

The other major, exogenous variable which may effect rates of adoption is that of the external environment. Rogers and Shoemaker regard access to
information as the most important environmental factor although they accept that, in itself, communication is not a sufficient condition for the adoption of innovation since decision makers have differential access to information. Following the early work of Katz, Burt (81) showed that integration into communication networks fosters the adoption of innovation. However, little seems to be known about the dynamics of information flows or about how information networks develop and neither Katz nor Burt expand on these aspects.

Some work has been done to compare the effect of formal versus informal communication between organisations. For example, Martilla (82) found that word-of-mouth processes may affect the diffusion of innovation. In the early stages, formal channels of communication were reckoned to be important whilst informal channels assumed a greater importance when decisions to adopt or not adopt were actually made. On the whole, Katz's original propositions remain largely undeveloped.

The effects of turbulence and volatility in the external environment have been noted by several researchers. Thus Burns and Stalker were to observe differences between a cotton mill and an electronics company and Lawrence and Lorsch between the plastics industry and the container industry. In both cases the researchers were mainly concerned with examining the implications of environment for organisation structure. To some extent the structural forms chosen as appropriate to environmental conditions constrain the way in which innovation might be perceived and absorbed. In fact Yin (83) has argued that bureaucratic self-interest plays a large role in the adoption and subsequent routinisation of innovation. Publicity value, visibility and possible career enhancement may all influence the way in which managers choose to respond to external conditions.

Many studies which consider the processes of internal change in organisations devote considerable attention to the possible role of change agents. Little attention appears to have been given to the role of outside brokers specifically in the context of the adoption and diffusion of innovation. Yet, within the United Kingdom, there are many agencies in which such a theme is central to their ethos. In a general sense, as in other countries, there are government agencies, business schools,
universities and consultants. A report by the Computer Services Agency (84) in 1980 put the sources of outside assistance for microelectronics in industry as deriving 55% from consultancies, 30% from hardware suppliers, 10% from academics and 5% from general outside sources.

The interest of government in microelectronics and computing goes beyond that shown for some other innovations. For example in a note to a report published in 1978, the Secretary of State for Employment wrote,

"Microelectronics is the most pervasive new technology . . . technological change gives us an opportunity which we must not miss to modernise our industry and expand our markets.

. . . the rapid diffusion of advanced technologies is central to improvements in productivity and the maintenance of the UK’s competitive trading position." (85)

Thus in addition to specialist agencies such as the National Computer Centre, the government set up two principal schemes. The first, the Microprocessor Application Project (MAP) was set up in 1978 to provide training, consultancy and grants of up to 25% for certain qualifying projects. The second, set up in 1981 was the Microelectronics Education Programme (MEP). The MEP (delayed two years by a change of government) aimed to promote knowledge of and use of microelectronics. The programme used techniques such as exhibitions, promotional literature, conferences and the subsidised provision of microcomputers to schools. In so far as MAP was directed at manufacturing industry and the products of MEP have yet to work through the education system, it is unlikely that either have had much direct impact on the service sector of the economy.

Professional bodies may also be regarded as important external change agents. However, in the case of either the hotel or the catering sector, it may reasonably be assumed that the influence of such bodies is negligible in affecting the spread of innovation. Not only is the level of membership low as already mentioned but neither the Hotel, Catering and Institutional Management Association or the Hospital Caterers’ Association provide professional guidance to their members. Technical committees to deal with the implications of microelectronics and computers, and to provide advice, do not form a part of their respective ways of working.
During the period of this study, three external change agents may be identified, though their effect on organisations within the hotel and catering industry have not been isolated. The first of these is the British Association of Hotel Accountants (BAHA). BAHA is a pseudo professional body which is manipulated for commercial gain by a company which sells computer systems to the hotel industry. Whatever its motives it has been influential in raising levels of awareness. In 1978 it promoted the first national conference to deal specifically with the effects of microelectronics in the hotel and catering industry under the name of The Electronic Hotel Seminar. Papers presented at this conference were intended to raise issues likely to confront the industry as a result of technological innovation based on microelectronics. The conference became institutionalised as in the form of Hotech (HOtel/TECHnology), an annual event which includes an increasingly large exhibition.

The second major change agent became closely involved with Hotech. The Hotel and Catering Industry Training Board (the HCITB) is one of several training boards which felt itself under threat of closure as a result of the British government's stated intention to reduce public expenditure on "quangos". The HCITB identified this aspect of change as one in which it could be seen to be offering a positive lead to the industry. By choosing to use this as a form of organisational development the HCITB provides an illustration of Feller and Menzel’s contention that innovation may sometimes be used as a strategy for coping with uncertainty. In 1980 the HCITB published a research report prepared by Gamble at the University of Surrey (87) which examined the implications of microcomputers for small and medium hotel and catering firms. This first step was followed by an increasingly important role in the organisation of Hotech, the establishment of a permanent exhibition of computer systems at HCITB headquarters in 1984 and the introduction of a distance learning course (Open Tech) in information technology in 1985.

Perhaps the third major change agent during the period of this study might be the work of the University of Surrey in general and the work of Gamble and Kipps (88) in particular. The Department of Hotel and Catering Management initiated several important developments in the area of
computer assisted learning (CAL) which were copied and used by a number of other hotel schools in the UK and elsewhere. Such work cannot be regarded as a trigger in itself but coupled with increasing levels of awareness generally may be considered to have influenced the pace of development in this particular domain. The initiation, development and implementation of the Catering Information System by the University of Surrey is described more fully in chapter 8. At the time of its inception in 1979 there were no microcomputer based food control systems in the UK. By 1985, over 200 systems of this type were in regular use. Again, no direct causal link can be established and claims are properly treated with caution, for reasons of self interest brokers of innovation have a tendency to overstate their own role. However, it is conceivable that the credibility of Catering Information Systems was enhanced by this early work.

3.3 The Characteristics of Innovation Adopters

There are perhaps four most quoted studies, three of them British, which examine the effects of innovation. Carter and Williams from 1957 (89), Myers and Marquis from 1969 (90), Langrish et al in 1972 (91) and Rothwell reported here from 1977 (92). Rothwell was closely involved with project Sappho (Scientific Activity Predictor from Patterns with Heuristic Origins) at the Science Policy Research Unit of the University of Sussex which published some interesting findings in 1972 (93).

Based on nine major empirical studies (including his own work) representing together the effects of over 1,000 industrial innovations Rothwell (94) has compiled a list of the characteristics of successful innovators and technically progressive firms. The stance of these studies is mainly predicated on the basis of organisations which wish to use technological innovation as part of a marketable product. In the hotel and catering industry technological change in the realm of microelectronics will affect processes rather than the fundamental products of shelter, rest, food and drink. Nevertheless, a review of the characteristics of successful product innovators is of interest and the summary below is presented in the order in which it is given by Rothwell.
a) Good communication and effective collaboration

The need for good communication both internally and externally was one of only two factors generally agreed in all nine studies. In this context, the role of informal communication was confirmed by two studies and the need to collaborate with outside agencies (particularly customers) was emphasised. In a hotel or catering context it may be postulated that collaboration with staff from an early stage, in terms of consultation and trial runs may be important.

b) Innovation as a corporate wide task

The chances of successful innovation are increased if there is good internal co-operation and co-ordination. If the innovation is narrowly confined to specialist technical departments, performance may be achieved at the expense of practice. Specialist research and development departments are almost unknown in hotel and catering. The guideline may therefore be interpreted along the lines of shared understanding and a willingness to co-operate.

c) Efficient design and development work

If first models perform badly, poor reputation is difficult to overcome. This may well hold true in the case of consumer products but its importance in process innovation is more difficult to ascertain. A highly committed work group can and will sustain even badly designed processes. For example, both traditional Whitney systems used to record hotel reservations and traditional food cost control procedures are error prone and inaccurate. The Whitney system was introduced prior to World War II and current manual food cost controls are based on techniques developed in the 1960s.

d) Planning and Management Techniques

Managers who use production planning and control techniques and who attempt to produce meaningful forecasts are more likely to be able to innovate successfully. In particular this is associated with product
development strategies and strategic planning. The use of technique is an attribute associated primarily with product development and therefore relates less to a service industry like hotel and catering. Perhaps the main component worth noting is the role of management in selecting projects consistent with (product development) policy though such policies are not common in this sphere of economic activity.

e) Quality of Management, Personnel Policy and Management Style

Quality is a difficult word. Rothwell appears to refer to managers with high technical qualifications and to the formation of effective training programmes. He suggests that innovative managers are open minded and progressive since unless top management has the will to innovate, there is little that other members of an organisation can do to expedite effective innovation. He goes on to associate successful innovation with open, horizontal management styles along the lines of Burns and Stalker’s organic structural form. Although this accords with the findings of Kaplan and Mytinger on the importance of leadership styles, it does not take into account Corwins’ reports on the effect of external environments. This may be an example of the pro-innovation bias described earlier. Open mindedness and progressiveness are seen as positive attributes in the same way that a predisposition to innovate is seen as positive.

From the data presented earlier it will be recalled that the majority of managers in the hotel and catering sector are unqualified in the sense of formal training at a higher level. A study of perceptions of management style reported by the Ashridge Management Centre in 1973 (95) indicated that the ‘great majority’ of hotel employees saw their bosses management style as autocratic. By contrast the study reported a more evenly balanced range of management styles in manufacturing units. At the same time, Ashridge noted that there seemed to be a preference for this style of management from hotel workers which was not linked to high levels of dissatisfaction with management style.
f) Marketing and User Needs

This was the second area of agreement across nine all studies considered by Rothwell and was seen as the most critical in determining success or failure of the innovation. Most (about 75%) successful innovations occurred in response to need pull as opposed to technology push. Need pull represents a recognition of some sort of need. By contrast, technology push implies the production of an innovation in order to exploit some new technology, attractive to a manager or inventor. It has already been noted that the hotel industry is positional rather than innovative in Nystroms' terminology and is unlikely to offer technological products for their own sake. In an article describing the application (or lack of) advanced telecommunications in the British hotel industry, Mr. A.F. Boyce director of group systems for Trusthouse Forte the largest hotel and catering company in the UK said,

"However, general availability [of advanced telecommunications systems] within hotels will follow, rather than lead, the domestic market." (96)

g) After Sales Service and User Education

Following a marketing approach, the value of training and user support is important to the success of the innovation. Clearly in marketing process innovation based on new technology some care must be taken to support the implementation. This is especially important for an industry such as hotel and catering with its low proportion of technical staff. Rothwell points out that faults which are considered minor by technically competent innovators may prove insuperable to an uninformed user. The observation is especially pertinent in the case of the microcomputer based procedures discussed in this study and the effectiveness of technical support and after sales service is likely to have had a direct bearing on successful implementation.
h) Key Individuals

A key individual is a 'product champion' or technical innovator. He or she is a senior middle manager who enthusiastically supports the innovation proposed by the chief executive or senior manager. The position of the product champion is important in that he or she must be in a position of sufficient authority and power (Rothwell uses these terms without discrimination) to weld the various phases of the innovation together. In chapter 1 (section 2.1) the distinction between initiating change and activating change was noted. Rothwell's proposals are consistent with the idea of an initiative for technological intervention from the top, which is carried out not by a technological department, since hotel and catering organisations do not tend to create them, but by a technically committed middle manager. The empirical work in this research tends to support the finding in general.

3.4 A Summary of Findings - Management, Organisation and Innovation

It is not useful to confine perspectives of technology to those based substantially on apparatus or machinery. Technology encompasses changes to the social processes by which organisations seek to achieve objectives. Thus descriptions of technological interventions are common in the literature for the last ninety years and it is interesting to notice how slowly ideas diffuse into management practice. Techniques discarded at the turn of the century are re-used with similar dysfunctional effects in recent space programmes.

Many writers have sought to establish links between technology and organisation structure. Two principal approaches have been noted. The quantitative approach seeks to correlate measurable aspects of structure with the dominant technology, taking data from many organisations. The descriptive approach tries to develop insights about structure from detailed studies of one or a few organisations and draws little on quantitative methods. However, neither set of theorists is able to offer a satisfactory causal link between technology and structure. On the whole, imperatives for structure based on technology, size or context (environment) are inconvenient to defend empirically. In particular
technological determinism presents difficulties as a prescriptive framework for hotel and catering organisations because they are characterised by different technologies and different cultures within the same unit. A view of organisations as self designing structures offers the possibility that form may be a function of the way in which technology is used to achieve organisational objectives.

Management might be expected to have an important role in this process both in selecting objectives and in influencing the adoption and diffusion of technological innovation. The innovation literature deals predominantly with the way in which innovations, perceived as ideas, practices or objects which depart from the current state of the art, may be diffused into organisations. Diffusion is considered to have taken place completely when the innovation is widely accepted as current best practice. The factors which affect the rate of adoption and diffusion might be categorised under three headings.

The first of these is the condition of the organisation in terms of perceiving a need for innovation and creating conditions by which it may be adopted. The extent to which organisations are predisposed to innovate varies. Hotel and catering organisations would not generally conform to a profile of organisations with a latent predisposition to innovate. The key variables which might alter this condition are political pressures by coalitions of work groups or the value system of managers.

The second set of factors influencing rates of adoption are those of the innovation itself. In the case of technology based on microelectronics several of the attributes which influence rates of adoption positively are difficult to evaluate objectively. Relative advantage, compatibility, complexity and even trialability are to some extent dependent on the perceptual framework chosen. Only in the case of observability is it possible to show objectively that propositions made elsewhere are also valid in the hotel and catering industry.

The characteristics of innovation adopters would appear to be the third set of factors. A review of the characteristics of successful product innovators seem to suggest that good internal and external communication and a marketing approach to user needs are widely agreed to be of crucial
importance.

4 The Role of Managers in Relation to the Adoption of Technical Change

McLuhan's view of an important new communications technology (television) as a cool medium that would sweep all before it, cited in chapter 1 (97), has been echoed in similar vein by other writers concerned with the pressures of technological change. For example, writing in 1970, Toffler argued that,

"Important new machines do more than suggest or compel changes in other machines - they suggest novel solutions to social, philosophical, even personal problems. They alter man's total intellectual environment - the way he looks at the world." (98)

Developments in microelectronics which lead to the rapid evolution of the computer and telecommunications industry during the 1970s, has resulted in one of the most significant technical changes, one of the the most powerful machine based changes, experienced in man's industrial history. Its effects on modern social systems are as yet too recent to fully determine. Inventions of similar importance such as the steam engine, the railway, the motor car and electric power were to result in devastating social effects in the short term for which history has little sympathy. Mankind's ability to manipulate information, through developments in microelectronics, is presenting managers with some exciting innovative opportunities. Writing twelve years after Toffler, Halal observed,

"The history of business is a long story of social change, and the rate and type of change is now especially severe because it involves a transformation from one era to another - a paradigm shift. But visionary leaders will emerge, hopefully, who understand these unusual opportunities and are able to create new institutional structures and political coalitions.

Although these will be formidable challenges, the inexorable power of information technology is silently driving social evolution in these directions." (99)

The question to be examined here is whether such leaders may be found in
the hotel and catering industry and the nature and effect of their influence. The importance of management intentions in affecting the form and the behaviour of organisations has been noted by many writers. In the adoption of innovation, the attitudes of key administrators have been widely hypothesised to correlate positively with rates of adoption. Hage and Dewar (100) were able to confirm the hypothesis that administrators with positive attitudes to change were more likely to adopt innovations and similar results were reported by Kaplan (101). In a health department study, Mohr (102) found that administrators with less favourable attitudes to traditional technologies were also more likely to adopt innovations. Consistent with the propositions of Rogers and Shoemaker, tests of attitude to risk as an independent variable, appear inconclusive.

In a study of innovation in the shoe manufacturing industry, Cohn (103) set out to determine whether results of work in the public sector could be generalised to firms in the commercial sector. Using a five point Likert scale, Cohn employed a technique similar to that used in the earlier studies. He devised questions to measure three sets of preferences. Preferences for change (three questions), preferences for traditional technology (two questions) and preferences for risk (two questions). Results were then correlated with the adoption rate of nine innovations agreed as important with equipment manufacturers. The technique therefore has great similarity with the quantitative approaches to the study of determinants of organisational structure alluded to earlier.

In general, Cohn's findings support those of Hage and Dewar, Kaplan and Mohr but with two most important codicils. The first of these is the absence of a consistent relationship between presidential (chief executive) attitudes and adoption. He accounts for this in terms of the consensual management style employed in the shoe industry and suggests therefore that the chief executive's influence may depend on the decision making structure of the firm. The second codicil relates to adoption behaviour and the attitudes of the total management staff. This had not been fully examined in earlier studies. Cohn found a link between the behaviour of senior middle managers and the rate of adoption of innovations. He argues that the risk and uncertainty of planning for change may be borne by a few managers who bring an innovation to trial. Favourable attitudes (and results) amongst these managers may then foster
the necessary co-operation and support from other managers. On the other hand, unfavourable attitudes to innovation by the total managerial staff do not seem to impede the innovation if it is supported by a senior manager. The risks of adoption are borne by those who decide to support the trial.

The findings may have great consequence for this investigation of innovation adoption in the hotel and catering industry. In the hotel sector, it may be expected that the attitudes of senior managers will be of great significance due to the authoritarian management style manifest in such organisations. By contrast, the Catering Information System developed as part of this study was introduced to the very large scale, hospital organisations of the National Health Service by middle managers.

Following research based on eight hotels, Shamir (104) has suggested a view of organisation structure as a control mechanism reflecting the value system of those with the power to influence it. He suggests that conflicting constraints and demands are resolved by the use of compensating mechanisms and organisational forms within the unit. The nature of managerial attitudes to computer technology and possible relationships of these attitudes with the politics of decision taking in hotel and catering organisations, affecting task and structure, will be discussed in the next two chapters. The inclination and anticipated effect of management value systems may then be determined.
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CHAPTER 3

Management Attitudes to Information Technology

1. Methods of Studying Management Behaviour

It seems, from the arguments presented earlier, that the attitudes and the values of managers are important determinants of the effect of technology on organisations. Given that need pull and good communication are generally agreed to be associated with successful innovators it follows that a successful, innovative manager might be someone able to relate the needs of his organisation to an application of technology. In a sense, a manager is generally concerned with the application of technology to resources in order to attain objectives. Such a person must be able to influence the organisation, or at least a part of it, to engage in an activity of uncertain outcome. Influencing the behaviour of others in this way is generally reckoned to be an important social process, closely related to leadership.

If the basis of this influence is power related, along the lines suggested by French and Raven (1) then it might be expected to derive from one of two sources. Innovation introduced by a senior manager may be seen as a function of coercive or legitimate power. This might be the case in a hotel where information technology has been introduced by a senior manager. If the innovation is introduced by a middle manager, since Cohn (2) has shown this to be a significant source of adoption in some situations, then the basis of the power may be reward, referent, expert or, following the later work of Raven and Kruglanski (3), informational. The catering manager of a hospital is a middle manager and would have to derive a power base in this fashion. Such a typology of power could easily be simplified in terms of punishment and reward. Compliance to senior managers being sanctioned by fear of punishment, compliance to middle managers being sanctioned by a belief that this will be in the best interests of the individual or work group.
Whatever the source of the power, it is clear that in order to exercise it the manager must hold a set of beliefs both in the value of the innovation and in his or her ability to influence the effects of the innovation on the organisation in a particular way. Organisational behaviours have been studied by management writers in a variety of ways, some of which were considered in this research. Bessant (4) has listed activity centred studies ranging from investigations of factors affecting individual performance through to the examination of organisational aggregates, under twenty classifications. Using this list as a base, five broad headings can be identified each offering the framework for an approach to the problem of how innovations might be introduced to an organisation.

The first heading, organisational studies, includes those that examine size, structure, technology and the external environment. Many of these have been alluded to in previous chapters.

A second set might be identified as studies that consider the way in which organisations or individuals develop themselves through learning. Work by Kolb (5), Miller et al (6), Gagné (7) and Johnson (8) may be cited as examples.

The introduction of change as an effect of management style and leadership is a possible third classification. Studies such as those conducted by Likert (9), Fiedler (10), Tannenbaum (11) and Blake and Mouton (12) have considered the interaction of leadership style with elements of task and performance. The suitability of a leadership style in relation to the character of the work group that it seeks to influence and the response elicited by leadership initiatives is of interest to these writers.

It is very difficult to dissociate the character of work groups from that of leadership style so there is some overlap with the fourth category, that of group functioning. Curiously enough, there seem to be few studies of roles for followers, although Argyle (13) has produced some work in this area. However, group roles and processes, alienation in groups and the motivation of different specialist groups have been written about
extensively. Examples can be given of work by Bales (14), Benne and Sheats (15), Blauner (16) and even Maslow (17), Herzberg (18), and Vroom (19) could be included here.

Problem solving and information processing models might comprise the fifth set. In general these consider the way in which managers structure problem environments, solve problems and make decisions. The former might be illustrated by the Carnegie group such as Newell and Simon (20), March and Simon (21) or more lately Mintzberg et al (22). Information processing has been written about by cognitive psychologists such as Guilford (23), Festinger (24) and Osborn (25). As examples of decision making it is convenient to include design studies by Asimow (26), Marples (27) and Gregory (28) at this point.

Each of these approaches has something to offer by way of insight and perspective. However, it is clear that the attitudes and the intentions of the innovating manager and the work group which is introduced to the innovation will have an important influence on the effect which the innovation has on the organisation. The political character of groups as described by Pettigrew (29) and Pfeffer (30) will be examined more closely in the next chapter. For the moment it is useful to attend to the attitudes of the individual manager and the manner in which his or her way of seeing the world affects the both intention to innovate and the purposes to which the innovation might be put.

2 Seeing the World as a Manager Sees It

2.1 The Nature of Personal Constructs

Vickers (31) has pointed out that the categories, 'objective' and 'subjective' as they are commonly defined, are inadequate to comprehend the combined process of design and discovery that goes into human knowing. The argument here is between a view of reality as a perception or a view of reality as a construction. The idea is not new, in the first century AD, Epictetus is reported as observing that, "men are disturbed not by
things, but by the views they take of them". In dealing with the effect of innovations such as the use of microcomputers in hotels and catering organisations, an argument consistent with the findings presented in the previous chapter can be sustained. It is not the nature of the innovation but the significance or meaning of the innovation for the manager that is important.

To a certain extent, all knowledge is subjective. Indeed, Vickers has argued that today's philosophers of science are increasingly driven to the conclusion that reality derives whatever validity it has from a consensus of informed minds to recognise and treat it in a certain way. Thus an attempt to separate role of the manager as it might be interpreted by the organisation and the way in which the manager as an individual sees the world, hinders the development of insights into the relationship between beliefs and actions. In supporting a view of organisations as tools, Perrow for example has suggested that organisations,

"provide the means for imposing one's definition of the proper affairs of men upon other men." (32)

This seems to link very closely to the notions of Silverman (33), Bowey (34) and Weick (35) of organisations as a constantly changing set of roles, relationships and structures. The way in which an innovation is construed will therefore determine to a large extent the likelihood and manner of its adoption. Silverman has gone so far as to suggest that meanings are social facts, socially sustained and socially changed. The following passage illustrates a part of his argument.

"In other words, much of the time at least - but certainly not all of the time - social actors are 'cultural dopes', complying with and accepting the situational definitions which are pre-established and legitimated by the common culture characterising their particular social location: a culture which tells them what to know and what to know that their partners know." (36)

Again, the thread of this idea stretches back for many years. The classic
experiments carried out by Serif (37) as long ago as 1936 have shown that in order to organise and manage themselves, groups develop a system of norms. In order for an innovation to be adopted it seems reasonable to suggest that either a senior or a middle manager must construe it as important, perhaps even central, to the continued functioning of the organisation or group. This belief is legitimised for the group through the power of the manager as leader. It is not argued that managers have a leadership role in all aspects of group functioning or that group norms do not on occasion influence the individual beliefs of their members. However, in the particular context of the adoption of innovation, it is considered that the leadership role of managers is of primary importance. Thus the way in which managers see the world in relation to a given innovation must be examined if the way in which innovations are adopted by organisations is to be understood.

The view of man as a personal scientist was first proposed by George Kelly (38) in 1955. In speaking of man as a scientist, Kelly was not referring to a particular class of people who have attained the stature of "scientists" in the public sense but rather man-the-scientist whose ultimate aim is to predict and control the world in which he or she lives. The phrase is being used as a metaphysical tool for describing how a person might function as if they were a scientist. Kelly hypothesised that man-the-scientist would formulate constructs which are intended to help these predictions. Kelly argued that constructs are used all the time to forecast events and that behind each single act of judgement lies an implicit theory about the realm of events within which judgements are made. Each person has their own theoretical framework within which they live. They 'bet' on it behaviourally, they form expectations and derive hypothesis on the basis of it, they test the framework by taking decisions and by observing outcomes (living with the results). Finally, as a result of outcomes the theory or framework may be modified.

Like any good scientist, man is concerned with the accuracy and relevance of the theories which he uses. Thus he may validate some constructs if validational evidence is quickly available though on occasions the
validation may be redundant or misconstrued. Thus to predict an angry response to a personal attack may validate the construct of an acquaintance as unfriendly. Alternatively, an otherwise neutral enquiry from a neighbour to pass the time of day may be used to validate a construction of nosiness. Constructs may also be tested on an experimental basis if the potential consequences of their use is hazardous. Such testing is characteristic of an alert person. On the other hand if a person dreads the consequences of such testing then he may be reluctant to either express or test them. Indeed there are a few constructs, such as theories about life after death, that most people are in no hurry to validate.

If the world were static and unchanging then theories about its nature could also remain fixed. Since this is not the case there is a constant need in a healthy individual to consolidate, revise and maybe abandon or reformulate some constructs. Indeed, since there are no constructs which will predict every aspect of the universe absolutely each person has to be satisfied with a series of successive approximations. There are always alternative constructs to choose from in dealing with the world, in fact Kelly called this "constructive alternativism". However, in order to deal with the world at any moment the person has to choose a particular construct as a basis on which to act. If he or she were to alter constructs willy nilly then it is likely that the individual would get into difficulty. The yardstick being used is the assumed specific predictive efficiency of each construct and of the construct system of which it is a part.

A parallel may be observed here between construct theory and open systems theory. In open systems theory the organisation relaxes its boundaries with the environment so as to absorb external inputs and, by adapting, increases its chances of survival. However, complete permeability and constant restructuring confuse the definition of the organisation itself. From time to time the organisation needs to consolidate new structures and new relationships with the outside world. During this period it is less responsive to change, its boundaries are less open. An individual is
faced with similar problems. Some redefinition of constructs is an important survival characteristic but constant redefinition leaves no basis for action. From time to time particular constructs must be selected as the basis of action and during this period, constructs are less susceptible to change.

Kelly defined a construct as the erection of a theoretical structure. In its minimum context, a construct is a way of differentiating three elements such that two are seen as alike and thereby different from the third. The act of construing involves placing an interpretation upon what is construed (39). The structure itself is essentially an abstract produced by the person. Sets of constructs represent networks of meaning through which a person handles the universe. The construct provides an axis of reference which guides behaviour. Kelly likened this to a navigational chart. It equates to psychological approaches, attitudes, habits, a method of coding information which provide each person with their own personal network of action pathways both opening and limiting passages of freedom.

In construing an individual notes features in a series of elements, some of which characterise and some of which are uncharacteristic of a particular element. The construct is erected on the basis of similarities and differences and both are important to the nature of the construct itself. Without contrast the construct would "leave the person engulfed in a sea with no landmarks to relieve the monotony". Without similarity the world would present the person with "an interminable series of kaleidoscopic changes in which nothing would ever appear familiar". Thus a construct is a way in which some things are construed as being alike yet different from others. Each construct is therefore dichotomous or bipolar in nature. When one pole of a construct is affirmed, by implication its opposite is denied. For example, a person might erect a construct KIND - CRUEL as a way of differentiating between significant people in their life. Thus when describing mother as KIND, by implication the person is also saying mother is not CRUEL.
Another important difference is that of more limited generality. This refers to what Kelly called the "range corollary". Under conventional logic, the terms respect and contempt would be considered as two separate concepts. Either of these concepts might be generalised in some way and it might be possible to obtain an understanding of the persons or actions to which each concept might be applied. A construct on the other hand carries the implication of contrast and is composed essentially of a dimension that runs between similarity and contrast. Since he was a clinical psychologist Kelly saw links here with Freud's recognition that in order to understand patients, it was necessary to consider what they did not say as much as what they did. In order to understand the way in which a person construes the world it is necessary to consider points of contrast as well as similarity.

A further aspect of range is that of convenience. Each construct, as used by one person has limited relevance to objects in the world. Elements lying within the range of convenience are said to constitute its context and contexts may vary from one person to another. For example, the construct ATTRACTIVE - UNATTRACTIVE may be applied by one person only to women. All men may be classified as UNATTRACTIVE in this construct or it may not be seen as relevant as a way of construing men. It is important to the application of the theory that the way in which some events or elements are construed as alike is the same as the way in which they are construed as being different from others. The attempt to understand the constructs of another is an attempt to see the world as seen by them, to stand in their shoes. This is not achieved if the limited relevance of the other's constructs is not recognised. In this illustration, to ask the other person to construe men (or other objects) on the construct ATTRACTIVE - UNATTRACTIVE would not further understanding.

Thus people differ in their ways of construing events. This can be accounted for in several ways. Each person's construct system will vary according to their own personal framework, the way in which they have successively replicated and reorganised their construct system according to their own life experience. Another aspect that contributes to
differences is the fact that people do not respond to stimulus objects directly but by construing their perception of that stimulus. Perceptions may vary from person to person. A person's perception will be 'coloured' by the personal frame of reference which he or she brings to the stimulus. In a sense, a construct system can be likened to a pair of spectacles through which the world is viewed. The expression, 'viewing the world through rose coloured spectacles' might spring to mind. Kelly described his theory formally in terms of a fundamental postulate, a person's processes are psychologically channelised by the ways in which they anticipate events, and several corollaries. Finally, each person may choose for him or herself the alternative in a dichotomised construct through which he or she might extend and redefine a construct system.

From the point of view of a third party, the two corollaries of most interest are those of commonality and sociality. The commonality corollary argues that to the extent that one person employs a construction of experience which is similar to that employed by another, his or her processes are psychologically similar to those of the other person. The sociality corollary suggests that to the extent that one person construes the construction process of another, they may play a role in the social process involving the other person.

It has been suggested that Kelly subscribed to a belief that a system of personal constructs could be modelled as a system of verbal tags (40). In such a way linguistics and cognition can be related in the practice of discovering the form and content of a construct system. However, this is an unfair simplification of Kelly's theory. Kelly accepted that some people may have difficulty in verbalising some of their constructs and accepted that many verbalisations were incomplete representations of constructs. However, a person's verbalisations is one way through which an attempt can be made to understand his or her constructs and it is the basis of techniques which have been developed.

In recognising and arguing for the importance of coming to an understanding of the way in which a person sees his or her world, Kelly's
theory has parallels with those of humanistic psychologists such as Rogers (41). However, Kelly was critical of humanistic psychologists who talked about the need but did not attempt to invent a means of coming to know. Thus he said,

"Humanistic psychology needs a technology through which to express its humane intentions. Humanity needs to be implemented not merely characterised or eulogised." (42)

Kelly attempted to develop such a technology through his repertory grid techniques.

2.2 Repertory Grid Techniques

Kelly contributed some important theoretical notions on which many others have built. In addition to his theory of personal constructs he devised a method for analysing another's view of the world which has come to be described generically as a repertory grid test or sometimes even Kelly's grid. Grid techniques encompass a particular form of structured interview which seeks to understand the system of constructs used by another person. By aggregating or quantifying the degree to which an element leans towards one end of a construct pole (recall that each construct is associated with two poles) and by applying some statistical and/or charting techniques to the result, it is possible to produce a kind of map or chart ("the grid") which describes the network of constructs held by another person. These maps are about as accurate and informative as those of the American coastline provided by Columbus, according to Fransella and Bannister (43) which may be to judge them rather harshly. The observation is perhaps best interpreted as a measure of the state of the art.

Kelly devised grids as a method for exploring personal construct systems. The original grid was the 'Role Construct Repertory Test' which Kelly developed for "looking beyond words".

"For example, does the client use the word 'affectionate' only when talking about persons of
As the name implies, the Role Construct Repertory Test involved a patient in construing his role in relation to others. The first job for the interviewee was to produce a role list. The list was made up from the names of people with a particular importance to the patient such as, his mother, father, physician, minister, the person with whom he feels most uncomfortable and so on. The test focuses on construct elicitation, its purpose being to help the therapist understand the major dimensions used by the patient to order his social world. Another grid type described by Kelly but little used in practice is known as the Dependency Grid or the Situational Resources Repertory Test. It aims to relate situations to a personal world in order to examine circumstances which people (or more specifically patients) might consider stressful and to help them recognise other people on whom they might call for help. Everyone is dependent on others to a certain extent and this grid seeks to measure the nature of that dependency.

Many other grid types have since been created. For example, Hinkle (45) devised two further forms of grid, again relating mainly to the self. These he termed an Implications Grid and a Resistance to Change grid. The grids concentrate primarily on comparisons of constructs rather than elements and are not as widely used as some other forms. As Hinkle proposed them, they can be used for considering the extent to which a person updates or modifies their construing as their life experience changes.

Bi-polar Implications Grids have been used by Fransella (46) for looking at the different relationships that may exist between the poles of two constructs. For example the poles of construct 'love - hate' may be related in some way to the construct 'pleasant - unpleasant'. There is at present no satisfactory way of analysing such grids by an objective, quantifiable method. As a result Implications Grids and Bi-polar
Implications Grids are not as widely used as some others.

The facility to score grids, for whatever reasons, is clearly considered an important attribute by some of their protagonists. For example, Fransella and Bannister introduce their Manual of Repertory Grid Techniques with the following passage.

"Let us suppose that Fred supposes that people with 'cold eyes' tend to be 'mean with their money'. Let us suppose that Fred is a psychologist... Fred will undoubtedly yearn to give his notions a statistical foundation, so it will not surprise us when he sets out to survey his landscape of people and judge them, in each case, in terms of the dimensions 'cold eyed - warm eyed' and 'mean - generous'. He may then cast his observations in the form of a chi-square..." (47)

Kelly's early writings are not couched in quite so didactic a tone. He seems to offer his ideas as beliefs which suit a purpose and he chooses not to quarrel with those who hold other beliefs. Thus he does not affect a dogmatic posture in his discussion of concepts versus constructs. He seems to say simply that this particular way of looking at the world is helpful to his work. In relation to the mathematical implications of his construct corollaries he points out that all mathematical expressions, when applied to real events, are at best approximations. School children are often warned that you cannot add apples and oranges and Kelly acknowledges that the old arithmetic adage applies in the analysis of constructs too. Both elements can be construed in terms of 'fruitiness', if a person is prepared to use such an abstraction but it must be recognised that in doing so some elements of 'apple-ness' and 'orange-ness' must be subsumed. Anything which is enumerated or to which discrete values are attached, depends on the ability to abstract where one thing leaves off and another begins, in terms of similarities and differences. So that,

"...any mathematical expression relies on the concept-formation task which has preceded it. Mathematical manipulation does not reify data,

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though it often provides a handy way of testing the adequacy of our conceptualizations.

What we are saying is that when a person anticipates events by construing their replications, he lays the ground for mathematical reasoning. All mathematical reasoning is utterly dependent upon the premathematical construing process which gives it something to enumerate. We think this is important. (48)

Kelly's disciples no doubt acknowledge this precept. However, there is a predilection for analysing grids by means of computer programs which will manipulate the concrete expression of constructs expressed as numbers. The manipulation of sets of numbers by computer has a tendency to add an air of possibly spurious scientific precision to the analysis of grids in one form or another. Several writers warn against this but such caveats are often associated with an adjuration for a proper regard for the rules of statistics. The reader is sometimes left with the impression that provided such rules are followed, then a meaningful interpretation of construct relationships will result. A hint of exasperation with a lack of precision may also be detected, as in the following passage. "Naturally enough, being Kelly, the [dependency] grid does not set out to enable the psychologist to assess the degree of dependence or independence an individual possesses relative to the general multitude." (49)

In the fields of psychotherapy, grids are used to portray the form or parts of a patient's construct system which are believed to be relevant to his or her life problem. However, in recent years, analysts have been using grid techniques for a variety of applications including, research into sex stereotyping, management development, identification of training needs, and other types of organisational research. Indeed, as Fransella and Bannister are at pains to point out, a grid is not a test but a very flexible technique or method, limited in application only by the user's imagination. All forms of grid allow a person to tell others something of the way in which he or she sees the world. There is no fixed content, no one particular form is appropriate for a given situation and there is consequently less need to depend on normative data for the pattern that is
revealed. Two forms of grid dominate the literature and were considered for the purposes of this research.

2.21 Principal Component and Factor Analysed Grids

It is convenient to consider this type of grid as a Ranking or Rating Grid which is analysed by means of factor analysis. The method was first described by Bannister (50) and it owes its derivation directly to Kelly’s Role Construct Repertory Test. In common with other grids, it has two principal constituents.

An element is "the thing or event abstracted by a construct." (51) Elements in a grid should be "representative of the area which is being construed" and can be anything relevant to that area. If the area under investigation is attitudes to bread then the elements will be different types of bread. (52)

A construct is "a way in which some things are alike and yet different from others. In its minimum context a construct would be a way in which two things are alike and different from a third. It should be kept in mind that the way in which the two things are like each other should be the same way in which they are different from a third." (53)

The method for analysing a ranking grid, explained in Fransella and Bannister (54), proceeds as follows.

a) A list of elements is devised representative of the area being studied. In the example given by Bannister the elements have similarities to Kelly's role title list. It is not exactly a list of people (mother, father, brother) but a list of types or groups such as, an older person, one person, a few people and so on.

b) The constructs are elicited from the subject, in a manner to be explained below, and consist of situations in which the subject has
to interact with the elements. A construct might therefore be, "a situation in which the person would be likely to be critical of you."

c) The list of elements and the list of constructs are written on cards. All the element cards are laid on the table in front of the subject. Then, taking one construct at a time, the subject is asked to rank the elements in relation to each construct. Some care is taken to avoid presenting elements in a manner that will introduce bias.

d) In this fashion, an element grid is obtained. The number of each element as written on the cards is listed under the number of each construct, in the order in which they were chosen.

e) This list is now turned into a rank order grid by substituting the rank of each element for its position on the list.

f) Rank order correlations for the grid in e) are then computed using Spearman's rho.

g) The correlations are squared so that they can be added and then each is multiplied by 100 to produce a relationship score. The squaring would remove the sign but since this has a psychological significance it is in fact retained. Thus a correlation of -0.90 is converted to a relationship score of -81.

h) The relationship scores are added to give a total relationship score for each construct. It is now possible to plot the constructs on two axes. The construct yielding the highest relationship score is used for one axis. This is known as the emergent pole and is the construct which relates most highly to all the other constructs. The second axis, known as the contrast pole, is the construct accounting for the next highest variance but which is not significantly correlated with the first.

i) A plot is now obtained of the remaining constructs based on their
relationship scores with these two axes.

j) If required, a similar technique can be used to produce element scores so that a perception can be expressed in respect of the central construct.

The method has been described here in some detail merely to illustrate the obvious attraction which computers must have for such a procedure. A typical grid of perhaps ten elements and ten constructs would require several thousand calculations in order to compute rankings, correlations and relationship scores. The point is cautionary as Fransella and Bannister record.

"Few who have used grids have not found themselves mesmerised by a matrix. Bannister recounts how, in the search for a score, he once found himself adding up ranks along the diagonals." (55)

One of the earliest computer programs for analysing grids of this type was written by Slater (56) in 1964. Known as INGRID, it was designed to analyse rating grids. Constructs are expressed as poles along the lines of Osgood's semantic differential such as RATIONAL - IRRATIONAL. Elements are then rated on a scale, for each construct. Rating in this way is more flexible than ranking though the subsequent data are more difficult to deal with. INGRID produces a plot of the two principal components, with an output similar to that achieved by Bannister's ranking method, showing the distances between principal components of the grid.

2.22 Cluster Analysed Grids

"The problems for the analysis of the grid for feedback purposes fall into two major categories: methods for exhibiting pattern and structure in the grid responses, and methods for psychological scaling in general." (57)

Some of the most interesting work on the application of grid techniques in the late 1970s was carried out at Brunel University's Centre for the Study
of Human Learning by L.F. Thomas and M.L.G. Shaw. The passage quoted above, taken from Shaw's book, illustrates her concern with ways of interpreting grids by the use of computers, in such a fashion that the user can be reassured that the computer has not invented or misconstrued his or her intentions.

As grids have come to be employed for a wider range of applications, particularly those to do with the personal development of managers and workers in business, more writers have expressed interest in helping managers to use the technique. For example, Stewart and Stewart (58) in comparing several methods for analysing grids suggest that it is often possible to obtain an insight into another's construing by simply studying a pattern of crosses and ticks in a matrix. Where elements are discrete they suggest that simple frequency counts may also be quite revealing. Should a more mathematical approach be indicated then some content analysis can be derived by dividing constructs into types. Whilst Kelly uses five classifications of construct, impermeable, permeable, pre-emptive, constellatory and propositional, Stewart and Stewart use only three, propositional, sensory and evaluative. The proportion of constructs in each class may be counted and, if desired a chi-square test may be used to compare relative distributions.

In practice, most grid analyses are carried out using statistics, in particular those which look at similarity matrices or correlation. Factor analysis and principal component analysis are examples of such methods though multidimensional scaling is also sometimes used. In the past, access to computer power has been a constraint and whilst such access is now of negligible importance, access to appropriate software may still be a problem.

With business counselling the purpose is not to model the world of a sick person. The aim is more to heighten self awareness and perhaps even enable a manager to communicate more effectively with others through a better understanding of shared perceptions. In this context, meanings are both relative and personal and Kelly's personal scientist is more of an
artist or a craftsman than a mass-producer of insights. The subject might well work closely with a psychologist or counsellor in order to interpret a grid. Indeed this is fundamental to increasing self awareness but it is not always possible in practice. In this research such feedback was not part of the "contract" understood by the interviewee.

"For most grid studies, good politics and good research go hand in hand; it is only in the most extractive of studies, where both parties accept that this is so, that you should work without feedback - knowing the price you pay for doing this." (59)

Shaw's work with Thomas centred on the use of a fourth method of statistical analysis, that of clustering, as a way of improving "learning-centred" methods of grid feedback. Her aim was to devise a form of analysis in which,

"models may be brought into awareness, revised, refined, or even rebuilt to enable learning to be more successful in those areas where inadequate modelling was hindering the learning process. Creative change is the essence of learning, but change can too easily take place in such a way as to have no anchoring points .. " (60)

The general form of a cluster analysed grid, as described by Shaw is similar in some ways to that of a rating grid. Elements are elicited from the interviewee, or may be offered to him, and he is then asked to construe each element. An example of a method for doing this will be given below. Elements are then rated on a constant scale in terms of each construct. Thus, given a scale of say, 1 to 5 the construct LIKE - DISLIKE may be assigned a value of 1 for LIKE and 5 for DISLIKE. The interviewee is then be asked to rate each element in terms of the construct so that he may rate 'a computer' as 4 if he quite dislikes it or 5 if he dislikes it completely. The selection of the scale and the assignment of values to constructs is quite arbitrary. The matrix that results from these ratings can then be analysed by clustering.
Shaw devised several computer programs for assisting with many aspects of this process, including elicitation, reordering and analysis of grids, interactive feedback during grid elicitation and comparison of grids from individuals and even from groups of people. Perhaps the best known of these is a program called FOCUS which uses a two-way cluster technique to reorder rows of constructs and columns of elements so that there is least variation between adjacent constructs and elements. The program also guides the user in drawing a dendrogram, the program does not draw a dendrogram by itself but prints a list of instructions on how it may be done by hand. The resulting output is said to be focused, hence the program name.

2.23 A Comparison of Analytic Methods for Grids

It is interesting to compare the two approaches that have been described following a scheme offered by Stewart and Stewart. (61)

Cluster Analysis (FOCUS) Principal Component Analysis (INGRID)

Keeps all the grid details in presenting its analysis. Discards some detail of the grid when plotting on two axes only.

Allows comparison of grids if either elements OR constructs are held constant. Comparison of grids is possible only if both constructs AND elements are held constant.

Easy to administer interactively. Difficult to administer interactively.

Easy to demonstrate what the computer has done. Harder to demonstrate what the computer has done (especially to a non-statistician).

Uses non-parametric statistics. 4 is more than 2 and less than 5 but makes no assumptions about absolute differences. Uses parametric statistics. 4 is twice as much as 2, the difference between 2 and 4 is the same as between 3 and 5.

Requires close inspection in order to grasp relationships between constructs and elements. Presentation is easy to grasp.
Both Stewart and Stewart, and Shaw have observations on the effect of computing resources on grid analysis. Shaw reflects that the statistical packages available have sometimes had more bearing on the method of analysis chosen than other more relevant concerns and Stewart and Stewart point out that component analysis is cheaper to process by computer than clustering. The programs that Shaw developed were originally written for an expensive PDP 12 computer in the Psychology Department of Brunei University. Many of these have now been reworked to run on inexpensive personal computers. Indeed, one of the programs developed for this research was run on a hobby computer costing just over £100. This may be indicative of a fruitful area of future research, to examine the impact of the availability of computing power on the techniques employed by psychologists!

Determining an Applicable Grid Technique for an Investigation of Management Attitudes to Computers

It has been suggested that the attitudes of managers is crucial to the predisposition to innovate, the way that innovations are adopted and the effect that innovations might have on the organisation to which they are introduced. A proposition that the effect of computers in the hotel and catering industry depends on the attitudes of senior and middle managers would therefore seem to be a reasonable starting point for investigation. A number of questions suggest themselves. Do managers perceive computers as threatening or non-threatening? How do they relate them to other kinds of technology which they use? How do they think that computers will affect their jobs and the way in which they work now or in the future? An approach - avoidance function is pertinent, perhaps the rate of innovation is affected by whether managers see computers as pleasurable or unpleasurable? A hypothesis that adoption rates are related to the psychological stance of the manager seems tenable. As Kelly points out,

"Men change things by changing themselves first, and they accomplish their objectives, if at all, only by paying the price of altering themselves."

(62)

P.R. Gamble
3.1 A Factor Analysis Approach

Given the method described so clearly in Fransella and Bannister, it was determined initially to experiment with a grid technique based on factor analysis. Since it was intended to undertake a number of interviews it was important to be able to computerise the analysis. Factoring offered a number of attractions. Not least of these was that by 1983, inexpensive home computers offered sufficient processing power not only for computation of the necessary tables but also for the production, display and printing of an attractive graphic output. If the grid was to be discussed interactively, as the first part of an interview programme, the facility to enter the data and produce the grid in a manager’s office was thought to be a major advantage.

Accordingly, a computer program was written for a 48k Sinclair Spectrum microcomputer with a Sinclair electrostatic printer. The computer was attached to a domestic, colour television and an inexpensive tape recorder. Given that most households possess the latter, the computing equipment cost just over £225 at the time. It should also be noted that the equipment was highly portable. Most hotels are equipped with televisions and the computer is the size and shape of a slim book. The program uses an algorithm based closely on the method described by Bannister and took its statistical formulae for Spearman’s rho from Daniel and Terrell. (63) Unable to resist alliteration the program was entitled Gamble’s Grid Generator (GGG). The program listing is included in appendix 1, the version shown being completed in January 1984. The DATA statements in the program offer the facility of a demonstration mode so as to explain to interviewees the nature of what is to take place. Reproduction quality of the listing and the outputs shown below is limited by the performance of the Sinclair electrostatic printer.

The original intention was to offer the same set of elements and constructs to each interviewee so as to allow grids to be directly compared between subjects. The key issue to be dealt with in this plan
was whether it represented a valid approach. Kelly’s range corollary states that the elements in any form of grid must be relevant to the constructs used. Furthermore, findings generally support the idea that elicited constructs are more meaningful than provided constructs and in particular, these will be seen as more important by the person being interviewed. There is also the problem that if constructs are supplied, they will in any case be given a personal meaning by the interviewee.

Quite a literature appears to have developed over this problem. However, considerable reassurance is offered by Fransella and Bannister.

"There seems to be no need to be pedantic. For some purposes it is best to supply construct labels, at least in part." (64)

They go on to point out that for some experimental work it is necessary to supply specific verbal labels. In any case, labels supplied by the subject may not be as meaningful as those of interest to the interviewer in some situations. Provided that some care is taken to ensure that verbal labels are understood, there appears to be no definite evidence to indicate that constructs should not be provided. Indeed, whilst their findings are not incontrovertible, Warr and Coffman (65) have noted circumstances where elicited constructs are not always more meaningful. There is in fact little evidence to show that different forms of grid, when put to the same person, actually address the same question or even that the same grid put to the same person on different occasions, or in a different personal environment, will give the same answers. Such issues have not been avoided in the literature but they have not been exhaustively researched. It is difficult to avoid the conclusion that a particular grid offers a kind of photograph of another’s world. As such it is as meaningful as any photograph. Given the angle, the setting and the intention it offers a basis for interpretation.

On this basis it was decided to proceed with an interview that was tightly structured but not completely constrained. A great deal remains to be done in order to formulate a satisfactory motivational theory that will
explain which personality attributes distinguish managers who get to the top of an organisation from others. At this stage of the research, the manager was seen as Rothwell's 'key individual', a product champion of sufficient authority and power to weld the various phases of innovation together. In particular, McClelland’s work (66,67) seemed pertinent to this approach and a framework for interviews loosely related to some of his motivational research was established.

Since the introduction of a computer into hotel and catering organisations is a highly visible activity due to their low technology base, it was decided to test a hypothesis formed around a concern with success and failure. The postulate on which this was based assumed that an innovator was more likely to have a stronger drive for success and a greater need to avoid failure. It seemed likely that the product champion would need to be a forceful individual, with characteristics similar to those reported by McLelland and Boyatzis (68) in their sixteen year study of successful, non-technical managers in the American Telephone and Telegraph (AT&T) company. These people were found to have high achievement (N_Ach) and power (over people and events) needs (N_Power) but low needs for affiliation (N_Aff) in the sense of affection and loyalty from others.

Following two preliminary trials, the following form of structured interview was designed and tested on a senior/middle Catering Manager in a very large organisation, the Army Catering Corps.

3.11 The Nature of the Interview

The following passages describe the content of the interview to be used for grid elicitation.

Introduction

This study is examining the way people think about computers. There are no judgements here, it is not a question of good or bad or right or wrong. Just the attitudes that are held.

P.R. Gamble
I am going to ask you to think of some of the jobs that you have to do at work. I am then going to present you with different situations and ask you to assess the extent to which a computer would affect it.

The elements

The subject was to be asked to provide examples of the following types of job. In eliciting these elements it was intended to encourage the person to be quite specific and if possible, to choose examples with which they have been involved recently.

1. A routine job that you enjoy.
2. An important job where you depend on others for information or advice.
3. A difficult task involving management skills such as choosing between courses of action.
4. A job that you have to do but which you consider unimportant.
5. A job that involves you working closely with juniors and subordinates i.e. where you are thought of as the leader.
6. A job that involves you working closely with peers or superiors.
7. A difficult task requiring special technical skills or expertise (such as preparing a plan or budget or designing a procedure).
8. A job where others will judge your performance.
9. A job where the decisions that are made may affect the future of your (department/company/self).
10. A job that you usually do well - choose something that you only do occasionally.
11. A routine job that you dislike - choose something that you do often.
12. A job that you usually do badly - choose something that you only do occasionally.

The Constructs

The constructs were provided so as to identify situations where the computer is perceived as most threatening or negative. A corollary could
be taken to discover where the most positive points are perceived.

1  A situation in which using a computer will not make any difference to your getting ahead. (NAch)
2  A situation in which using a computer is likely to make you less popular. (NAff)
3  A situation in which using a computer or a computer based technique will enable you to meet your own personal standards for doing your job. (NPower)
4  A situation in which forcing you to use a computer might make a bad impression on your boss or on your peers by exposing your lack of knowledge. (NAch)
5  A situation in which using a computer would lessen your feeling of being in control. (NPower)
6  A situation in which using a computer will earn you praise. (NAff)
7  A situation in which using a computer will make you look dynamic and up to date. (NAff)
8  A situation in which using a computer will enable you to work better with others. (NAff)
9  A situation in which using a computer will make you look better than other people (who do the same sort of job or hold similar positions). (NPower)
10 A situation in which using a computer would make you feel good. (NAch)
**FIGURE 1**

Report from the Computer Program GGG

**Initial Element Matrix (Input) and Rank Matrix (Computed)**

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**Matrix consists of ranks**
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**FIGURE 2**

Report from the Computer Program GGG

Construct Correlation Matrix Computed Using Spearman’s Rho

Construct Relationship Scores and Total Relationship Scores (after Bannister)

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**CONSTRUCT CORRELATION MATRIX**

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**TOTAL RELATIONSHIP SCORES**

P.R. Gamble
FIGURE 3

Report from the Computer Program GGG

Construct Map Showing Emergent and Contrast Poles

Summary of Construct Scores

Summary of Element Scores

The element most affecting expose deficiencies is element 9. Imp./dependent task.

P.R. Gamble
The Output from Program GGG

It will be observed that the method followed is modelled closely on Bannister's approach described in section 2.21 above. The elements that are elicited correspond to the role list, though in this case comprising of jobs rather than people. The constructs were provided but based on examples taken from the interviewee's own experience. The output produced by the computer program GGG from this approach is shown in figures 1, 2 and 3. Figure 1 shows the initial element matrix and the rank matrix. Figure 2, shows the correlation matrix, the construct relationship scores and the total relationship scores. Figure 3, which is the most interesting, shows the analysis in the form of a construct map, construct score summary and element scores.

3.12 An Evaluation of Main Findings

It is interesting to note from figure 3 that element scores reveal the element most affecting construct 4, a situation in which forcing you to use a computer might make a bad impression on peers or superiors by exposing a lack of knowledge, to be element 2, a task where you depend on others for information or advice. Since this is a logical assumption it seems to suggest that the grid is at least capable of being rationalised.

However, it is apparent from figure 3 that if pursued, this approach would not help to develop insights about the attitudes of innovating managers and innovation averse managers in relation to computer technology and hotel and catering organisations. As Stewart and Stewart have pointed out, the factor analysis does discard quite a lot of information in the original grid. What is more, an arbitrary choice has to be made in this case of the emergent pole, both construct 6 and construct 7 have a relationship score of 264. It is also clear that the grid does not relate attitudes to computers to other kinds of technology or to technology in general. In practice it seems reasonable to assume that any task on which you are dependent on others for information is most likely to expose your deficiencies to peers or superiors, whether those "others" are co-workers...
or computers.

The expected poles of NPower and NAch did not actually emerge. Interestingly enough, the dominant factors seemed to be NAch and NAff, needs for achievement linked to needs for affiliation. This rather reflects the findings of Harrell and Stahl (69) who found that a sample of undergraduate students had high affiliation needs, moderate achievement needs and low power needs, an exact reversal of McClelland and Boyatzis' analysis of highly promoted non-technical managers in AT&T.

Whilst the results may have something to say about the motivational stance of managers as related to the use of computers, it was decided that it actually revealed little about predisposition to innovate and the method was not continued.

3.2 A Cluster Analysis Approach

Cluster analysis is a technique that can take a large amount of information about a number of objects and produce a simple, unique "tree diagram", known as a dendrogram, that will express the relationship of those objects' similarities and differences in a way that can be taken in at a glance. The usefulness of a dendrogram is to allow for the recognition of patterns in data sets. Most cluster analysis techniques start with a matrix of similarities or distances between elements in the data and produce a dendrogram based on the minimum or maximum distance between each of the points, as required. Gengerelli defined a cluster as,

"an aggregate of points in the test space such that the distance between any two points in the cluster is less than the distance between any point in the cluster and any point not in it." (70)

In examining a dendrogram of constructs or elements, a cluster pattern will reveal three interesting pieces of information. The first will be the relationship between the elements or constructs in the cluster. It might then be possible to make statements about the way in which hotel and catering managers construe computers in relation to other types of technology that they use in their jobs. The constructs which are used to construe these elements can also be examined to try and identify the
approaches and avoidances which are likely to affect the behaviour of the manager. There may be differences in the patterns of construing between innovators and non-innovators or between computer literate and computer averse managers.

A second interesting set of information might be gained from the "richness" of the construing. From Kelly's theory, it might be expected that a person who is knowledgeable and interested in a subject has a rich pattern of constructions about it. He or she will be able to relate it extensively to other ideas that are held and will be able to differentiate between these constructs in a relatively sophisticated way. By contrast, a person with limited interest in a topic will reflect a paucity of ideas by expressing merely a few, relatively undifferentiated constructs. For example, the construct, HAS A KEYBOARD – DOES NOT HAVE A KEYBOARD is a superficial way of distinguishing between a computer and say, a television.

A third set of conclusions might be related to the "tightness" or "looseness" of the construing. It is more difficult to draw general conclusions from tightness or looseness. In Kelly's terms tight construing could be taken to indicate a lack of openness and may indicate a need for control, symptomatic of a sense of threat. It may also be associated with hostility and demonstrate a disinclination for personal growth by reordering constructs to reflect changes in the world. On the other hand, totally loose construing could be almost schizophrenic, symbolising a person adrift on that "sea without landmarks". This is one set of extremes. However, it will be recalled that a cycle between tight and loose construing is followed as a person seeks to reorganise constructs to reflect changes in the world. As the need for a decision approaches, some tightening of constructs is necessary to provide a firm basis on which to act. If tight construing is reflected in the dendrogram, it may simply suggest that the person has organised their ideas ready to take some action.

3.21 The Development of a Mathematical Cluster Analysis Program – CAP

The cluster analysis program (CAP) that was initially used to analyse the construct and element grids was based on an algorithm developed by P.R. Gamble
Hartigan (71), adapted by Spencer (72) and subsequently modified by Gamble. The program was written in BASICA and compiled by a Microsoft BASIC compiler. A program listing is shown as appendix 2. Although the hardware used for this program was fairly sophisticated, being an IBM PC AT with 640k RAM, a 20 Mbyte hard disk and attached to an IBM Proprinter, the program is simpler in many respects than its successor, MONOCLE. A version of CAP was produced which runs acceptably fast on a Z80, CP/M microcomputer with only 56k of RAM.

The most complicated parts of the program are the graphics routines which build the dendrogram from lines 1460 to 1840 in the listing. Well over half the program, from lines 2360 to the end at 5060, is to do with entering, filing and recalling data files. The actual calculations for the dendrogram are performed in the beginning.

In the earlier discussion of grid techniques under section 2.2, reference was made to the school children's adage which warns of the danger of adding apples to oranges. CAP skirts this difficulty by scaling and normalising the data set before it is presented to the clustering routines. Thus lines 330 to 420 compute the sums of squares, lines 430 to 490 calculate means and standard deviations, and lines 500 to 540 convert the data to standard normal form in which each variable has a mean of 0 and a standard deviation of 1. The equations for making these calculations are well known and can be obtained from Daniel and Terrell (73). The method for building the linked list, constructed in lines 560 to 1090 may be illustrated by reference to figure 4.

Figure 4 shows a reduced data set with three elements and two constructs. Since the data are normalised, the elements are plotted against the constructs without reference to the nature of the scale. At this stage only the distance between points is important not the unit of measurement. The algorithm proceeds as follows.

a) Calculate the distance between all pairs of points as in diagram A.

b) Select the two closest points, e1 and e2 in diagram B, and create a new point with co-ordinates that are the average of these two. The new point is calculated as the square of the geometric distance in
lines 710 and 720 and the new co-ordinate is computed as a weighted average in lines 780 to 800.

c) Discard the first two points (e1 and e2) and calculate the distances between all remaining pairs of points. In effect, this returns to section a). Once again, this leads to the creation of a new average co-ordinate as shown in diagram C. Since each new point is actually a weighted average, the weight being equal to the number of simple points that it contains, the second average point would be closer to the nodes e1, e2 than to e3.

Note that there is no intention to "discard" any nodes in practice as they are needed for producing the dendrogram. Thus, they are simply swapped to the bottom of the list in lines 840 to 940 and taken out of further consideration by decremented the counter NC in lines 1080 to 1090.

d) Finally, a dendrogram is drawn as in diagram D. The horizontal lines are representative of the lengths of the distance between points, that is, equivalent to the distances d1 and d2. They are connected in the same order as the final composite (element) name with vertical lines which are also indicative of the distance between clusters.

The Cluster Analysis Program produces an output which indicates the minimum distance between sets of points and a dendrogram or tree diagram representing their relationship in Euclidian space. All the data are used and although weighting would be possible, each datum is given an equal weight in the raw grid. The order in which data are entered into the matrix has no effect. In this sense, the program is completely impersonal and will simply reveal to the user any geometric patterning that happens to be present. However, the patterns which are shown plot the distances between weighted nodes. On reflection, this was considered unsatisfactory as it seemed to introduce data not offered originally by the interviewee. A more purely descriptive approach was therefore sought.
FIGURE 4

An Illustration of the Algorithm used for the
Cluster Analysis Program (CAP) based on a subset of data

Diagram A)

Diagram B)

Diagram C)

Diagram D)

An illustration of the clustering algorithm with 3 elements and 2 constructs.
The model for a descriptive cluster analysis program was taken from Shaw's computer program FOCUS written in 1976 and its effects were described in 1979 by her book, *On Becoming a Personal Scientist*. Since it was to be taken as the model, the simplest approach would have been to use FOCUS itself. However, it appears that Shaw and Thomas experienced some differences in the way in which they each saw this particular part of the world and in 1984 were apparently disputing the copyright of the FOCUS program amongst others. Difficulties existed regarding the commercial availability of the program. Access to the use of the program was possible but clearly it could not be offered openly in connection with this research. Further, details of the algorithm which the program used for identifying clusters could not be discussed for obvious reasons. Each of these factors was considered important. Any program used in the research should be easily accessible and its workings should be explicable and verifiable in terms of the output generated. Thus whilst imitating existing computer programs is generally unproductive, in the circumstances it was considered to be justified.

Developing a new computer program for the cluster analysis also has an experimental value of its own. Shaw's description of the algorithm for FOCUS is both ambiguous and incomplete. (74) As such it contrasts with the style adopted by Bannister described earlier. It would not be possible to duplicate Shaw's results using her book as a source. Additional material obtained from the Centre for the Study of Human Learning at Brunel University (75) provided little further information about the central features of the algorithm used by FOCUS. In view of the pre-mathematical nature of grid analysis it was therefore determined to design a program that used a descriptive, rather than a mathematical method for clustering. A revised form of output was also designed with more complete labelling and a presentation which illustrated the tightness and looseness of clusters more clearly. Important assumptions necessary to this process were helpful in highlighting limitations to the interpretation of grids by the method. As a result, the name MONOCLE was chosen for the program to suggest its constraint of looking at only one aspect of the pattern of construing.
MONOCLE, written for a 128k Sinclair QL computer linked to an Epson MX80 printer, is a large and complex program. A program listing is included in appendix 3. In many respects, the flowchart for MONOCLE follows that given by Shaw for FOCUS. The grid data are input. Construct matching scores are then computed twice, the second time with all ratings reversed. The construct tree is then computed. At this point the actual choice of the original or reversed form of the construct is made before incorporation into a cluster. As constructs are bi-polar linear entities, this allows the program to make the best match with the appropriate pole. Element matching scores are also computed and printed. Since elements are not generally bi-polar, the element tree can then be printed. The original grid is now reordered on the basis of the element and construct lists and the new grid is printed with instructions on how to draw the dendrogram.

Construct scores are computed using Shaw's percentage matching scores technique. The procedure used is based on the absolute or "city block metric" method which gives a distribution for scores similar to that achieved by the algorithm illustrated in figure 4. The distance $d$, between constructs $i$ and $j$ is calculated from the equation,

\[ d_{ij} \rightarrow \frac{-200G_{di} + 100}{e(n - 1)} \]

where $e$ is the number of elements and $n$ is the rating scale running from 1 to $n$. This produces 100 for a perfect match, 0 for no similarity and -100 for a perfect negative match. The reversed construct grid is produced by deducting the original value from $n+1$. Thus if an element is initially rated on a particular construct as 5 out of a scale of 1 to 5, its reversed rating will be 1 i.e. 6 - 5. The reversed construct scores for this second grid are then calculated with equation 1.

Element scores are computed using,

\[ d_{ij} \rightarrow \frac{-100G_{di} + 100}{c(n - 1)} \]
where \( c \) is the number of constructs. This gives a score in the range, 100 for a perfect match and 0 for no match.

Shaw developed her own algorithm for producing the dendrogram. She rejected the original hierarchical method, first developed by McQuitty (76) because of its practice of adding new nodes to a matrix to replace each matched pair as it is made, as CAP does. In consequence the clusters that emerge from the grid lose some of their original patterning. FOCUS uses a technique of successively finding the highest matched pair within the grid, without altering or adding any new values. The method is described in outline by Shaw and her approach gives a more representative cluster output than would result if the McQuitty algorithm were used.

If the dendrogram is to reflect the construing of the user, without adding or changing anything then Shaw’s approach is certainly more useful. The MONOCLE program therefore seeks to copy the Shaw method. It creates a list of the highest matched pairs of rows and columns and then attempts to sequence the construct and the element numbers so that the closest matches are adjacent. The end of this process is a sequence of construct numbers and element numbers which act as the basis for printing a reordered grid.

That this is not a trivial procedure is indicated by the size of the program. Its complexity can be accounted for by reference to the problems mentioned earlier. These take three principal forms.

1) The sequence in which matches are made is to some extent arbitrary. It is possible for a number of construct matching scores to be equal and the order in which they are encountered by the program is determined only by the sequence in which they were elicited from the interviewee, that is, by their position in the matrix. The matrix is searched from left to right and top to bottom. High matches at the top left hand corner will be found first. This is similar to the problem encountered by the factoring program BGG, though it is possible that MONOCLE will preserve and reuse a duplicate match. It should also be recalled that clustering does not "discard" data in the same way as factoring.
b) As a result of this arbitrary encountering process, the dendrogram may come prematurely to a point, before all the constructs have been added. Some method is needed for dealing with such a case and McQuitty's approach or some sort of averaging is possible. This was rejected for the reason already stated. MONOCLE copes with the problem by forcing the offending pair negative and restarting its list building from the beginning. The pattern which emerges has therefore nothing added or changed. However, it merely represents the first path that the program could find through the matrix.

c) When adding a single link, following Shaw's argument, it is important not to split a highly matched pair. The link therefore has to be made to one side or the other and this may produce weaker links with other clusters.

Despite the difficulties, comparisons between dendrograms produced by FOCUS in examples given by Shaw and dendrograms of the same grids produced by MONOCLE, appear to reveal no significant differences in the pattern of clustering shown. The clusters are not identical but for the trials that were made, neither algorithm can claim consistent superiority. Comparative outputs from FOCUS and MONOCLE are included as appendix 4.

3.23 The Fallacy of Psychometrics and the Problem of Incomplete Models

"The scientific man has above all things to strive at self elimination in his judgements." (77)

So wrote Pearson in 1892 and in doing so perhaps summarised one of the principal characteristics of modern science, the rejection of direct experience. The principal has been illustrated by Weizenbaum (78) with reference to the world's first autonomous machines and, until the advent of the computer, the only truly important ones. As clocks became more widespread, they changed human perspective and provided man with a new, impoverished reality. Hunger and fatigue were no longer to be taken solely as the basis for eating or sleeping. Instead these actions were to be performed in response to an abstract model of a planetary system. Thus, even in everyday affairs, direct experience assumed a lesser importance. In science, indirect experience has become a highly valued
way of representing problems. Grids are an example of such indirect experiences, being an indirect and incomplete representation of another’s pattern of construing.

Weizenbaum, a leading figure in the world of computing, specialises in an area known as artificial intelligence. His concern is therefore with computers seen as devices which can replicate human reasoning processes. The word concern being used in this context to connote both interest and anxiety. His classic text on Computer Power and Human Reason examines some of the models used for human problem solving whose authors were referred to at the beginning of this chapter. Weizenbaum notes that sheer computational power, when used to address a problem, may sometimes inhibit a recognition that the founding hypothesis on which the work is based is fundamentally unsound. Computational effort creates the illusion that real work is being done. An analogy is drawn with the well known joke about the drunk who, having lost his keys in a particularly dark part of the street, chooses to search for them elsewhere under a lamp post because the light is so much better.

Weizenbaum argues that no branch of science has erected this lamp post more deliberately and with more enthusiasm than has psychology. He cites Miller for example,

"Many psychologists have come to take for granted in recent years . . that men and computers are merely two different species of a more abstract genus called 'information processing systems.'"
(79)

and goes on to suggest that this limiting of vision, akin to the effect of looking at things through a microscope, can only be justified if it enables us to see things that would otherwise be hidden. Weizenbaum seems disinclined to accept that the application of computers as "number crunchers" (fast, numerical calculators) to psychology can be justified in this way.

"Psychology has long tried to become 'scientific' by imitating that most spectacularly successful science, physics. . . psychology mistook the most superficial property of physics, its apparent preoccupation with numbers and mathematical
formulas, for the core that makes it a science. Large sections of psychology therefore tried to become as mathematical as possible, to count, to quantify, to identify its numbers with variables (preferably ones having Greek subscripted letters), and to manipulate its new found variables in systems of equations (preferably differential equations) and in matrices just as physicists do."

(80)

Weizenbaum is mainly writing to redress what he saw as a growing misperception of computers as reasoning machines. One contributory factor to misunderstanding the contribution of computers to problem analysis is their ability to 'put muscle' onto techniques more powerful than the ideas which they seek to explore. Clearly grid techniques lay themselves open to this kind of attack though it would be quite unreasonable to suggest that psychologists are not aware of the weakness. Kelly saw the grid as a pre-mathematical representation of an individual's psychological space. Other psychoanalysts have drawn attention to the potential problem that reams of numbers, output from a computer, may incline the user to the view that the technique is more scientific than its originator thought warrantable.

Commenting in similar vein on the selection and application of statistical techniques for mental testing, writing ten years before Weizenbaum, Hudson observed,

"At present psychology is an exploratory science, and as a consequence most of our statistical needs are simple. If - in the course of our research - we find ourselves teasing out a result with the statistical scalpel, working out our correlations to three places of decimals, this is surely a sign either of a poorly designed experiment, or of a result too trifling to pursue." (81)

Two years after Weizenbaum, Fransella and Bannister (82) also use the analogy of the drunk and the lamp post. They express some disquiet that grid techniques may divert research effort away from the development of more complete theories of personality in the same way that number based intelligence testing has diverted research away from thinking. "We have provided tools for tyranny in pursuit of spurious precision." They see this as a singularly poor way to repay their debt to Kelly for his
It would seem even less of a repayment if a tyro, following this path, should fail to avoid what Fransella and Bannister termed the psychometric fallacy. Shaw seemed to respond by developing computer programs which help the "psychologist as craftsman tease out forms and structures which are natural rather than imposed." (83) Nevertheless, having compared the similarity of the outputs from MONOCLE and FOCUS it is difficult to avoid the conclusion that some manipulation of data does not occur even in the FOCUS algorithm. Certainly, the algorithm of the MONOCLE program reflects the biases of the way in which its author construed the problem environment. A cautious approach is therefore augured when interpreting grid outputs although a complete elimination of the self, as suggested by Pearson, is probably impractical. It must be remembered that MONOCLE identifies clusters and attempts to reorder relationships of constructs and elements on the basis of incomplete models. Statistical comparisons between the way in which one person sees the world and that of another on the basis of results of this sort are probably not useful.

Grid Elicitation by Means of Personal Interviews

The method chosen to elicit the grids is based on the technique devised by Kelly and follows a procedure described by Stewart and Stewart (84). Three pilot interviews were conducted on staff in the Department of Management Studies for Tourism and Hotel Industries at the University of Surrey. Each pilot was evaluated with the interviewee to determine the extent to which he or she felt constrained by the technique. The elicitation of elements in particular was carefully considered with the particular purpose of relating microcomputers to other technology that managers used in their jobs. Some comparisons of elicited and provided constructs and elements were made. Finally, the degree to which the grids reflected possible patterns of construing were discussed with each person.

The form of interview selected was chosen on the basis of two primary criteria. First, these grids were meant to be extractive rather than to reflect back to the subject aspects of his or her own construing. Second, the interviews had to be capable of completion in a reasonable time. A feedback grid, analysed with the person being interviewed, takes
a long time to elicit. Since such feedback does not impinge on this research it was decided to analyse the grids after the interview, so as to keep the contact with managers to approximately one hour.

4.1 The Nature of the Interview

Introduction

[Ask permission to tape record]

This study is concerned with the use of techniques and technology by managers. By techniques I mean the use of procedures which help managers understand the nature of the decision that has to be made. Study reports, statistical analyses, decision tools like the Kempner-Tregoe method, or thinking aids like de Bono's lateral thinking are all examples of techniques. These are the kind of things learned during formal study at college, on company sponsored courses or through the experience and example of colleagues. Technology is meant to mean whatever you understand by the word.

Could you tell me what springs to mind, in connection with your job, whenever someone mentions the word technology?

Elicit Elements

Please tell me something about your job.

Could you illustrate what you do with examples of decisions that you have made say, in the last [ . . start with last two weeks, as examples run out extend time period backwards . . ] which will impact on the future shape and direction of your organisation/department. Perhaps we could try to collect ten examples of decisions that you have made in the last [ . . time period . . ]. At this stage, any decisions are of interest, they might be those affecting conditions of work, general administration or new procedures or those affecting new plans, products or markets.

For each decision.
a) Now I am interested in the techniques, tools or technology which you used to make these decisions. It is quite important for me not to put words into your mouth at this stage but by technique or tool I mean something like: a discussion with a colleague, a budget, a financial plan or a statistical analysis. By tool I mean gadgets such as telephones or computers as we discussed a moment ago.

b) Could you now think of a technique that you would have liked to have used but didn’t because it was not available to you for some reason?

c) And perhaps a technique or tool that you ought to have used, one that you know of as being relevant to this kind of decision, but which you didn’t seek out?

d) Do you think you will make this decision the same way in the future? How do you imagine you will change the technique which you use for making the decision?

This aims to elicit a list of ten to twelve elements which are then written on cards. If the word 'computer' has not been offered it is added to the list. It is the only element to be provided if required. The cards are then shown to the interviewee to ensure that the descriptions used are understood in the sense that they were offered.

Elicit Constructs

Constructs are elicited using Kelly’s method. Elements are presented to the interviewee in groups of three with the question, can you think of a way in which two of these are the same and one is different? A laddering technique, first described by Hinkle (85) is then used to obtain superordinate constructs. Laddering up is achieved by asking why, "why is that different, why is it important?" Laddering down is done by asking how, "how are they different?" In each case laddering is continued until such global or diffuse constructs are offered as to be useless. For example, if the response to a "why" question is along the lines, "it just is", a fresh triad of elements is offered.

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Triads of elements are initially offered based simply on the order of the list. Other sets are then constructed based on promising combinations which depend on the constructs offered.

Experiments with the pilot studies had shown that provided constructs tended to be clustered separately, that is, they were not reflected in the interviewee's construing. Therefore constructs are not provided unless the interviewee seems to be having difficulty with the technique.

Prepare the Grid

Since the process of eliciting constructs is rather slow, this procedure was not taped. A careful note, using where possible the exact form of words used by the interviewee, is made of each construct pole.

Using a scale of 1 to 5, or 1 to 7, the interviewee is then asked to rate each element on each construct. Following the pilot interviews, a scale of 1 to 7 was used in this research for the first two field interviews. In practice, it appeared that nothing was being gained by way of fine distinctions and after the first two field interviews the research reverted to a 1 to 5 scale. For example, if the construct LIKE - DISLIKE had been offered, and a scale of 1 to 5 is being used, the ratings procedure would be explained like this.

All the element cards are numbered, arbitrarily but in sequence.

Cards with the number 1 to 5 are laid on the desk. The interviewee is given the cards containing the names of each element and asked to rate them all as follows.

On a scale of 1 to 5, where 1 equals like and 5 equals dislike, could you please rate each of the elements? Thus, if you dislike something place it under 5. If you like it place it under 1. If you quite like or dislike it use 2 or 4 and if you are neutral about it use 3.

The rating of each element for each construct is noted on a table, later to be entered into MONOCLE. Since MONOCLE also checks for matches of

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reversed constructs as Shaw's FOCUS program does, it is of no significance which value is allocated to a particular pole.

Closing the Interview

Do you think that information technology in the form of new computers or new uses for computers will bring benefits to you personally in your job?

Do you have any concerns or fears that you may not be able to keep up with technology or that it might threaten your quality of life? For example, do you think it might make your job less enjoyable by reducing your freedom to make decisions?

Do you think the next generation of managers ought to know more about information technology and how to use it?

OR

How do you think technology could have helped you to make any of your decisions in a better way?

5 The Interview Programme

Although a sociometric approach is possible using grids, the purpose of this part of the research is to determine whether the way in which managers construe computers in relation to other parts of their world is likely to affect the way in which computers are used. It is also intended to discover whether the attitudes held might affect managers' predisposition to innovate. The technique described does not lend itself to large scale investigation. In view of the objectives, a small sample frame was considered appropriate. The interview programme was based on fifteen managers who are grouped into five sets of three people each.

Group 1 The Pre-Computer Managers

Subjects 1 to 3 were general managers of large, luxury hotels in Bombay, India. All three subjects were Indian. Interviewed in March 1985 this was a time when very few hotels in India were using computers (in fact two hotels in Delhi were about to become the first major users). At the time, no hotels in Bombay
had installed computers though India's first retail computer store had recently opened in the city of Bombay itself. In terms of hotel applications, India was in a position similar to the UK in the early 1960s.

Group 2  The Mid-Computer Managers

Subjects 4 to 6 were also general managers of large, luxury hotels in Penang and Kuala Lumpur, Malaysia. Subjects 4 and 6 were European and subject 5 was a Malaysian who had been educated in the UK. At the time of interviewing, August 1985, microcomputers were easily and widely available in Malaysia which has its own semiconductor industry. Whilst a few, large hotels in the capital had installed computer systems (mainly those with multinational connections), the use of small computers in Malaysian hotels was almost non-existent. Thus in terms of hotel applications, Malaysia was in a position similar to that of the UK in 1978.

Group 3  The Control Group

Subjects 7, 8 and 9 were respectively a personnel manager in a large London hotel, a major in the Army Catering Corps (equivalent to a middle/senior manager in a large catering organisation) and a catering technologist involved in commercial food production. In the same sequence they represent a computer averse manager, a confident computer user and a technologist seeking to use small computers both as an administrator and in other areas such as process control.

Group 4  The Hotel Managers

The hotel managers were selected to provide examples of large hotels which have or are making significant investments in major computer installations. They are all senior managers running large hotels. They represent examples of a successful decision, a replacement decision (for a failed installation) and a new decision. Findings are presented in the chapter 7 case studies.
Group 5 The Catering Managers

By contrast, each of the catering managers is a senior middle manager with less autonomy than that of the hotel managers. Each was concerned with the installation of microcomputer based systems of significance for their large scale operation, for which approval had to be obtained from a more senior administrator. Examples of an indifferent, an experimental and a successful innovation were chosen and the findings are reported in the chapter 8 case studies.

Initially, interviews were noted by hand but it was quickly determined that a taped record was needed if important detail were not to be lost. Each grid was analysed by MONOCLE. The complete program outputs including both the element and the construct clusters are included in appendix 5.

5.1 Attitudes to technology of group 1 - the pre-computer managers

5.11 Management Background

1 A senior man in charge of an 800 room, luxury operation, one of his company's flagship hotels, one of the best known in India. Aged about 45 to 50 he is relaxed and confident in his job. He is used as an adviser on new hotel developments in his company and is currently contributing to a project in Calcutta. He admits to being an economics graduate of Bombay University by correspondence and has been on a nine month course at the Hotel School in Salzburg, Austria. He does not mention that he started his career after a course at the Bombay Hotel School.

His desk is quite clear and there were no interruptions during the interview. His management style is precise and he sets aside specific times to see individual staff which he calls 'open hour'.

2 A junior manager running a second hotel in Bombay belonging to the same group as that run by manager 1. The hotel has about 400 rooms and does not carry the company's brand name, being used for its more
down market customers. Aged about 30, he trained at the Bombay Hotel School.

The manager's desk is cluttered and there are constant interruptions. These are attributed to an 'open door' policy. He is unable to concentrate and breaks off several times to undertake other small tasks. There is a sense of pressure and disorder.

Another senior manager in his late 40s or early 50s. He has regional responsibility for 5 of his company's units including the one in which his office is located, plus one under construction. The hotel where he is based is a four star, 500 room, business hotel which has its own general manager. The company is currently negotiating with the Sheraton Corporation for affiliated marketing links and is upgrading some properties to meet Sheraton standards. He completed three years training at the Salzburg Hotel School in 1959. He attends senior management seminars of the Sheraton group at which he comes into contact with American management techniques.

His style is relaxed and his replies to questions were measured. There were no interruptions. He seems to prefer to work through a system of committees, "since we have the people, let them talk and I listen".

5.12 Grid Elicitation

All three men are in situations where installation of a computer is imminent. Managers 1 and 2 work for a company which has already installed a computer at a hotel in Delhi. The initiative for selection is at a higher level in the company, by the managing director. Manager 3 will be obliged to install a computer in order to link to Sheraton's reservation network. There is no evidence of technology push in any of the cases. Manager 3 has received presentations from IBM but talked much more fully of his negotiations to place a contract for the purchase of chicken than of his progress on installing a major computer system.

Manager 1 was able to recognise his recent decisions clearly over the last 3 or 4 days but became vague and formless when an attempt was made to go
back further. He distinguished precisely between the process of making the decision and the tools used for making it. Thus he saw reports and meetings as part of technique but telephone and telex as tools, "these are my lifeblood."

Manager 2 had a great deal of difficulty in isolating decisions. He could not distinguish between processes and could not really grasp the concept of a tool. Much prompting was required to keep him on the subject. He could only think of two or three situations ("decisions") in which he had recently been involved and these were related as stories with himself as the central character. Perhaps significantly, the first of these referred to an elaborate description of the organisation of the staff social. He seemed to be obsessed with behaving (doing things rather than thinking about them). He claimed that he would already have installed and used a computer but was constrained by his company. He seemed anxious to make clear that the delay was not his fault.

Manager 3 had no trouble in identifying five major decisions, all of which were related to major capital expenditures. He was also well able to explain the elements of technology in his job. However he had enormous difficulty with construing elements and could not see ways in which two were the same and one was different. He kept saying that they were all different. He could not construe on the provided construct LIKE - DISLIKE since he liked all the elements as they were a part of his job. He returned frequently to the construct USE REGULARLY - USE IRREGULARLY.

5.13 Definitions of Technology

1 "Some sort of advancement, not only science, it motivates and advances."

2 "Something very systematic in the direction of giving you positive results. It also has a significant contribution to the time factor. Precise, to the point, clear cut."

3 "Mechanisation in terms of equipment, kitchen equipment, engineering, computerisation."

5.14 Grid Analysis

The reordered grids and clusters are shown in figures 5, 6 and 7...
The constructs LIKE - DISLIKE and TRUSTWORTHY - UNTRUSTWORTHY were provided. RELY ON LITTLE and NOT USED FREQUENTLY are closely related. Curiously enough, a computer is rated at the other end of these poles as RELY ON A LOT and LIFELINE, USE OFTEN, along with the telephone and the telex. This is curious because the manager does not have access to a computer, though he does seem to link computer bureau reports closely to computers and he could be thinking about them in the same way. JOB RELATED, IMPERSONAL and CONSIDERED DECISIONS seem to be important factors but the manager has no strong feelings about computers on these constructs. The other three pairs of elements closely related are:

DEPARTMENT HEAD REPORTS and DISCUSSION MEETINGS,
ONE TO ONE MEETINGS with staff and OPEN HOUR (in which any one individual member of staff could talk to the boss),
TELEPHONE and TELEX.

Two elements appear unrelated to the rest, CALCULATORS (which a manager at this level would use little) and the ARCHITECT’S DRAWINGS for the Calcutta project. COMPUTERS are related somewhere in the central element cluster. The patterns of constructs and elements seem to be reasonably sensible for this person and do not isolate computers in a significant way.

In his closing remarks, the manager talked about computers in terms of speed of decision making and faster information but these were not constructs which he offered during grid elicitation. It is possible that these are rationalisations.
Group 1 - The Pre-Computer Managers

Manager 1 - Cluster Analysis of Grid by Program MONOCLE

Cluster Presentation of Grid

Job probs 5 4 7 7 4 4 1 1 1 1
Consider 7 7 7 4 4 7 1 1 1 1
I use 7 1 1 2 7 7 1 2 1
Trust 1 2 1 1 1 4 4 1 1 4
Like 1 1 1 1 1 1 1 1 1 7
Rely lot 7 1 2 1 2 1 1 1 2 7
Lifeline 7 2 2 1 1 1 1 1 2 7
Recheck 7 4 1 7 1 1 1 2 1 2 2

---

Personal 5
On spot 4
Staff use 1
Not trust 8
Dislike 7
No rely 2
Not used 6
Finished 3

---

C.R. Gamble 1964

(C) P.R. Gamble 1964

P.R. Gamble
The grid patterns from manager 2 are an interesting contrast. The patterns are very tight, in marked contrast to those of manager 1. This may be indicative of hostility to the interviewer or to the subject. There seems to be a link between the constructs CONFIDENTIAL, IMPRECISE and EXPRESSES ME and then onto WEAK IMPACT which may be suggestive of the manager's perception of himself in relation to his job or to the world in general. In a tight group, only two elements are distinguished, INTERCOM and FINANCIAL REPORTS.

These are seen as markedly different from the others. They are construed as being, of WEAK IMPACT, NO TIME PRESSURE, CONFIDENTIAL, PASSING DATA without talking back, IMPERSONAL, PRECISE and PERIODIC. The intercom is linked to REACH BY VOICE and the reports to REACH BY MIND. The construct LIKE - DISLIKE was provided and is not linked to other constructs very well. COMPUTERS are linked most closely to CALCULATORS an unsophisticated level of comparison.

Again, closing remarks were generally positive about computers with a reference to their value for making faster decisions, a construct not offered earlier.
FIGURE 6

Group 1 - The Pre-Computer Managers

Manager 2 - Cluster Analysis of Grid by Program MONOCLE

Cluster Presentation of Grid

---

(C) P.R. Gamble 1984
Manager 3 has linked two sets of constructs. The first is the group; PRESENT, useful right now, UNFOCUSED, deals with many subjects and slightly less close; SLOWER to help you make a decision. Except for being FASTER, computers are not related strongly to this group. However, they are linked strongly to the second set, only use if FORCED and use IRREGULARLY. The elements of technology are patterned in three distinct sets. The primary set includes,

COMMITTEE MEETING, SPECIAL STUDY REPORT and SPECIAL FINANCIAL REPORT. Quite closely linked to these are CONSULTANT’S REPORTS.

The second set includes,

DEPARTMENT HEAD MEETINGS, REGULAR FINANCIAL REPORTS and TELEXES.

The third set comprises,

ONE TO ONE MEETINGS with senior staff, TELEPHONES and CALCULATORS.

COMPUTERS are related, loosely and illogically to the SPECIAL REPORT, COMMITTEE MEETING set.

In his closing remarks, this was the only manager to foresee some negative impacts. He saw the possibility of job losses through computers, staff reductions which he saw as attractive and justifiable.
Group 1 - The Pre-Computer Managers

Manager 3 - Cluster Analysis of Grid by Program MONOCLE

Cluster Presentation of Grid

Regular 1 2 3 4 5 6
Use much 2 3 4 5 6
Record 3 4 5 6 7
Faster 4 5 6 7 8
Future 5 6 7 8 9
Focus 6 7 8 9 10

Irregular 1 2 3 4 5
Forced 2 3 4 5 6
No record 3 4 5 6 7
Slower 4 5 6 7 8
Present 5 6 7 8 9
Unfocus 6 7 8 9 10

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5.15 Summary of Results from Group 1

The results are suggestive of managers with vaguely formed ideas about computers and their application, as might be expected. In particular, neither the more junior manager 2 nor the very senior manager 3 appear to have thought very deeply about computers in relation to other decision tools in their jobs. It is possible that manager 1 has misconstrued the nature of computers by relating them in his mind to reports from the computer bureau.

Each manager claimed to be keeping abreast of technology through magazines and periodicals and through meetings with other managers. Only manager 3 had the benefit of formal seminars.

Their views about the prospects of using computers were optimistic and naive. Neither manager 1 nor manager 2 could see any drawbacks or difficulties and anticipated that their staff would welcome the devices in a positive way. They claimed not to see computers as a threat to themselves or their own enjoyment of their jobs. Probably managers 1 and 3 were too well established to be threatened by a tool. All three managers saw computers as devices which would reduce costs and bring faster decision taking, though only one of them used a construct of this sort (faster decisions) when describing their job technology.

From the discussions and the words that were used, it might be suggested that these managers saw themselves particularly as working through people. "Open hour", "open door policy" and "committee meetings" were the phrases that they used. Technology is seen in terms of machines, speed and advancement none of which seems relevant to the way in which they do their jobs. Indeed, for manager 2, "precise, to the point, clear cut" may all be attributes which are anathema. For different reasons, computers simply had a kind of inevitability which had to be accepted.
5.2 Attitudes to technology of group 2 - the mid-computer managers

5.21 Management Background

4 Aged in his late 30s, early 40s, this general manager is running a 160 room Holiday Inn. The hotel is well equipped with recreation facilities and is located on the most famous beach of the Malaysian resort of Penang. French by nationality, the manager has no formal hotel school or management training. He began life in the industry as a cook and moved on to manage hotels in different parts of the world, having been in charge of this unit for four months.

The hotel is not linked into the Holiday Inn reservations network and does not have a computer. However, on his desk there is an Apricot PC microcomputer. In 1985 the Apricot PC was competing in the market place with IBM personal computers and had been purchased personally by the manager on the basis of its technical merits. He is thinking of adding a hard disk to this device. He introduced himself to computers whilst working in Hong Kong. He describes himself as "no friend to mathematics" but bought an earlier machine on which he taught himself to program in BASIC. He then progressed to using a spreadsheet called 'Visicalc' for his job and discovered that he had "created all kinds of new needs", hence the upgrade to the Apricot.

5 This man is in his mid 30s. A Malaysian of Chinese extraction he went to school and University in the UK where he obtained a degree in hotel administration. The hotel, which is owned and operated by the family company of which he is a director, is of the four star category has 100 bedrooms and is in the downtown area of Penang. The hotel is well known, being one of the oldest in Malaysia. It does not use computers for reservations or accountancy but a microcomputer has been installed for word processing and stock control.

The manager’s small office was some distance from the machine. Although he mentioned the introduction of the computer specifically, he did not seem to know how it operated, nor had he been involved with the training. The machine seemed to have been provided by a computer company operated by his brother and a friend.
Manager 6 is an Swiss-Italian who is in charge of a 400 bedroom hotel in the centre of Kuala Lumpur. "Twenty years ago" he completed a formal three year training at one of the world's best known hotel schools in Lausanne, Switzerland. Lausanne is noted for its emphasis on craft based training. The hotel, in the three/four star category is currently being renovated to allow it to respond more effectively to the severe competition in the city. He has a large office in the executive suite linked to a lobby area housing other offices. The lobby itself is used for secretaries.

The hotel is owned by a Chinese company. In common with other Malaysian/Chinese companies it tends to adopt a centralised system of organisation. It is equipped with a M$600,000 NCR computer system which is obviously inadequate for the nature of the hotel's business. The manager is at pains to point out that it was installed before he arrived.

5.22 Grid Elicitation

Manager 4 gave measured, precise answers. When asked to give examples of decisions he had no difficulty in thinking of half a dozen strategic examples over the past few months. He did not choose to cite operational, day to day decisions. His management style seems to be based on a combination of personal judgement coupled with a deliberate seeking out of either relevant "experts" or data. The expressions "personal judgement", "personal opinion" and "feeling or tone" were used quite often. His need for technical expertise he explained in terms of the generalist nature of a hotel manager's training. "I am a generalist - though that does not mean that I am not a specialist in my job."

Being a director of the family business, manager 5 seemed to feel a greater need to be able to control his hotel autocratically. There may be a cultural factor involved in such feelings. However his freedom to act is severely constrained by strong local unions. He had some difficulty in isolating decisions, in the same way as manager 2. Basically he could only refer to two types of decision, a staff
decision and a marketing decision. His management style can only be described as peripatetic with frequent visits to the hotel at different times, partial involvement in many activities, much movement round the building.

Manager 6 also had trouble thinking of decisions, though his initial reaction was that he made a lot of small decisions. Working for a Chinese owned company he was also subject to a centralised management style. "I propose decisions and either they or we decide, based on my suggestion." The examples that he recalled were predominantly small and routine. He displayed some impatience as the rating of elements continued and acknowledged that his attention span was not long. Again he seemed to prefer a role that allowed involvement in many small activities.

5.23 Definitions of Technology

"I would say that it includes the modern tools which are now available in our trade to perform in a more rational way and to give us . . the analysis that might have lacked in the past."

"To me technology is a word which covers a multitude of sins. It could mean the telephone, it could mean any audio visual gismo, computers, cars, equipment . . more equipment really. That springs to me when you say technology. I'm not sure that's a very good definition. Physical equipment, that would be my first trend of thinking."

"By technology I would define talking of machines or again, computers. Technology is really systems that have developed over the years, that is roughly how I would define technology. Systems which would be related, obviously, to a machine.

If you are talking of a specific computer, most of the hotels are now so-called computerised, whether it is front of house, back of house, the whole information which you have is much larger than we used to have many years ago. Without so-called technology or without computers, technology can be typewriters with memory. This is what I would define as technology. Machine based systems."

5.24 Grid Analysis

The reordered grids and clusters are shown in figures 8, 9 and 10.

There appears to be some close linking between the constructs,
Computers and Innovation in the Hospitality Industry

Chapter 3

PROVIDES IMMEDIATE FEEDBACK, INFORMATIVE and passive and STATIC. His personal computer is construed at the opposite end of two of these poles being, MANIPULATES DATA and DYNAMIC but quite close to the third, RAPID FEEDBACK. It is noticeable that GIVES FEELING or tone and COMMUNICATION DEVICE, does not calculate are not linked into these elements very much at all.

The elements most closely linked, construed identically are,

TELEPHONE and INTERCOM,

both obviously enough being voice communication devices. Beyond them there seem to be three other pairings;

PERSONAL COMPUTER and COMPUTER SIMULATION,
PERSONAL OPINION and ONE TO ONE MEETINGS with department heads,
STATISTICAL REPORTS and FILED RECORDS.

(Computer simulation refers to a spreadsheet analysis in this case). Voice communications are linked to the main cluster mostly through group meetings with the heads of departments but two of the four similar pairs are not related to the central cluster. The reports and records are rather out of the set, standing on their own. The computer based activities are also away from the main cluster and are clearly seen as different.

This manager has made a big impression on his hotel through the use of his personal computer. Both his chief accountant and front office manager were impressed with the way in which he had produced the annual budget in 3 hours, instead of the usual two weeks. In his closing remarks, manager 4 talked in positive terms of computers giving him the ability to assess and analyse situations more quickly and easily so that he could project and forecast more precisely. In common with managers in the first group however, neither precision nor speed were offered when construing his list of elements.
FIGURE 8

Group 2 - The Mid-Computer Managers

Manager 4 - Cluster Analysis of Grid by Program MONOCLE

Cluster Presentation of Grid
Subject 4 - 08.85

50 +
60 +
70 +
80 +
90 +
100 +

General 1st 5th 4th 3rd 2nd 1st 1st 3rd 4th
Ineffict. 4th 1st 2nd 3rd 4th 5th 4th 4th 4th
Specialist 8th 1st 3rd 2nd 3rd 5th 4th 5th 5th
Dynamic 2nd 1st 1st 2nd 2nd 5th 4th 3rd 5th
Slow feed 3rd 5th 4th 5th 4th 4th 2nd 3rd 4th 1st
Manipulate 6th 1st 1st 2nd 1st 3rd 2nd 3rd 2nd 5th
Calculate 7th 1st 1st 2nd 3rd 3rd 4th 4th 5th 3rd 5th 3rd
Imperson 5th 1st 1st 5th 3rd 1st 2nd 4th 4th 4th 2nd

Specific #1 Efficient #4 Self #8
Dynamic #2 Im. feed #3 Informs #6
Communte #7 Feeling #5

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Manager 5 had extreme difficulty in rating elements on his own constructs. The way in which the constructs are patterned may suggest a reason for this. SUBJECTIVE PRESENTATION, DERIVED FROM OWN actions and ONE WAY (as opposed to two way) are all related constructs separated from the rest. To some extent this appears to reflect his management style which can best be described as pyramidal, focusing on himself. His style seems to be both autocratic and machiavellian with some interest in manipulating groups within the hotel and within the local hotel association. These three main constructs are not linked closely to the others which he offered.

Style is also reflected in both the choice (group pressure) and patterning of element clusters which seems to present a series of unrelated subsets. It appears that within two of these, the elements are not distinguished in the mind of the manager. Thus;

FACSIMILE MACHINE, MICROCOMPUTER and COPIER,
CALCULATOR and DIGITAL TELEPHONE

are not distinguished from each other and represent two closely related groups. He explicitly observed that he did not use a calculator very much and it seems possible that these are all devices that he does not see as important. It seems that MICROCOMPUTERS are seen in the same way as devices which reproduce things. Similarly CALCULATORS are linked to DIGITAL TELEPHONES, perhaps because of the keyboard.

The other three sets of elements are;

HEAD OF DEPARTMENT MEETINGS, INVESTIGATIONS and SURVEYS, TELEX,
regular STATISTICAL REPORTS, INFORMAL DISCUSSIONS with STAFF (1 to 1)
PERSONAL EXPERIENCE, GROUP PRESSURE

The latter is an interesting pairing for a manager who seems predisposed to an autocratic management style but who is constrained by strong unions which limit his power. Perhaps manipulation is his answer to the situation.
Group 2 - The Mid-Computer Managers

Manager 5 - Cluster Analysis of Grid by Program MONOCLE

Cluster Presentation of Grid
Subject 5 - 08.85

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Manager 6 believes that "a hotel manager always works on percentages. If they are out of line, something is wrong". His most closely linked constructs are perhaps shown accurately therefore as, PEOPLE BASED and OTHER STATISTICAL DATA. The opposite of these poles was given as figure based, BUSINESS RELATED and FINANCIAL FIGURES. These are also linked credibly to PRODUCES INFORMATION as opposed to DISPLAYS INFORMATION. In a general way these constructs are drawn adjacent to a set which includes MORE SOPHISTICATED, USE A LOT and INFLEXIBLE, cannot be changed (meant in the sense of reliable).

He has construed the large NCR computer, which he regards as hopelessly inefficient because of the slow rate at which it produces reports, negatively. He sees it as USED QUITE A LOT, but UNSOPHISTICATED, GROUP BASED, DISPLAYS INFORMATION and BUSINESS RELATED. He also sees it as FLEXIBLE, can be changed which in his terms is probably meant in the sense of inconstant. The PERSONAL COMPUTER, with which he has no contact is seen similarly except that it is construed as SOPHISTICATED and DO NOT USE.

Within the element clusters, the unfamiliar personal computer is more or less isolated. The manager explained that he did not have a personal computer because his company would not buy one for him. His most frequently used tools are, TELEPHONE and CALCULATOR.

In contrast to manager 5, manager 6 said that he used a CALCULATOR often but like manager 5 had no use for an INTERCOM (hence it is in neither set). Other pairings are successively,

REVENUE REPORTS and COMPUTER REPORTS
PERSONAL JUDGEMENT and ONE TO ONE DISCUSSIONS WITH STAFF
STATISTICAL REPORTS and LARGE COMPUTER (NCR)

As well as setting the personal computer to one side of the grid, this construct pattern also sets in a group people related things, personal judgement, one to one meetings, regular head of department meetings, from machines and reports. The large NCR computer is seen
as something that has to be lived with. Although its reports come too late to be useful, manager 6 observed, "It’s all time actually. You must make proper use of the information. Older managers don’t read the [computer] reports. A lot of people need to be taught to read the reports. This stack of paper I can read or leave. I have to learn how to read it."

P.R. Gamble
FIGURE 10

Group 2 - The Mid-Computer Managers

Manager 6 - Cluster Analysis of Grid by Program MONOCLE

Cluster Presentation of Grid

Subject 6 - 08 - 85

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5.25 Summary of Results from Group 2

Each of these managers has direct contact with computers although two of them seem to perceive them somewhat phlegmatically, as if perhaps they are forced by circumstance to use them. There seems to be a stronger emphasis on the role of personal judgement, personal experience, feeling and tone from this group. The closing remarks of each manager were positive in the need to learn more about computers and to introduce them more into management training like the managers in group 1. There is no identifiable dislike or distancing. Manager 4 has purchased his own machine, manager 5 is using his brother to resource his computer needs, manager 6 went to work for a friend in Switzerland for three months so as to become familiar with the workings of an IBM front office system. This is all evidence of personal development. It is noticeable however that, once again when discussing the effect of computers on their jobs, all three men talked of productivity, faster decision making and more time, even though these are not constructs which they applied to the elements of technology in their jobs. Some perspective on the reasoning behind this might be obtained by quoting one or two of their remarks.

Manager 4

"Modern hotel management companies such as Holiday Inns, do employ an increasing number of analysts in hotel operations. These jobs have proved very, very productive. . . These people are trained to analyse what a basic hotel keeper is not trained to do. Yet if you train a hotel man to do that, then that poor man will spend most of his time in the office, and the client will be unattended outside. That does not mean that every single general manager is meant to spend his entire day in the lobby greeting people and shaking hands! A manager in the hotel industry is not supposed to spend too much time in the office. That is why I found these machines very powerful, because they can perform in seconds what our entire accounting team cannot perform in two days."

Manager 5

"What is a computer? A computer is my calculator, my mind is a computer. People are used to manual systems and computerise a manual system instead of using a computer to do other things."
You're acting so much in a vacuum anyway. I am making decisions I shouldn't be making unless I had more information but with pressure of time, crushing on me all the time, I've got to make decisions. I don't see how it [a computer] would reduce my freedom to make decisions. A human being is the best computer."

Manager 6

"Computers give you the information that you need, it is a backup. Twenty years ago people did not manage hotels differently. The hotel has not changed . . . food, drink, entertainment . . . the room layout has changed. The hotel today and twenty years ago is no different but systems at the back of the house are completely different. Now we have machines. In those days it was all hand made. The revenue report is now up to date, in those days it took two or three days to make. It's all time actually."

Each of these managers foresaw an increased use of computers. Manager 4 related an incident at the Holiday Inn regional management meeting. When asked by the area marketing manager how many persons present had a personal computer on their desk, only two or three out of eighty put up their hands. Next year he expected eighty percent of those hands to be raised.

It does not seem to be fear so much as relevance that is the key factor. Hotels, seen as unchanging fundamentally, are perceived as offering food, drink and accommodation with personal service. This is supported by personal decision making. Computers and information technology are simply not central to the way this process is affected. There seems to be emerging a postulate based on two possible premises. Computers seen as devices which either threaten or enhance the status quo and computers as examples of (machine based) technology which can be used to achieve some desired future state.
5.3 Attitudes to technology of group 3 - the control group

5.31 Management Background

The control group are so called because they represent managers not directly involved in general administration.

7 In his early 40s, manager 7 is the personnel manager of a large, central London luxury hotel. The hotel which has just over 500 rooms is American owned and has a large computer system with many terminals. He is expected to be people orientated due to his job. He does not use, or appear to like, computers.

Like managers 8 and 9, manager 7 is a member of the professional institute of the British hotel industry, the HCIMA. In addition he holds a post graduate degree in labour relations.

8 Manager 8 is equivalent to a senior middle manager in a very large catering organisation. As a major in the Army Catering Corps in his mid 30s he has a great deal of practical experience as both a line and staff manager. His recent appointments have been predominantly as a staff manager. He holds a first degree in hotel administration and at the time of interviewing was on secondment to the University of Surrey as a Defence Fellow registered for a higher degree. He is a confident, competent user of technology (including computers) and was expected to have a balanced view between people and machine orientation.

9 The third control, manager 9, was also in his early 40s. He has a first degree in systems and technology and works in the area of food production in manufacturing, equipment consultancy and systems planning for food and beverage operations. He works with systems based on small computers and owns a small, personal microcomputer used for playing games at home. It was expected that he would have a technological orientation.
5.32 Grid Elicitation

There were few significant differences in the way that the control group behaved. In contrast to the operational managers, each of them was more easily able to isolate events that they would class as decisions. Managers 7 and 9 gave six or seven examples but manager 8 gave ten. In each case, only one or two of these examples might be classed as strategic. In common with groups 1 and 2, none of these managers used any formal mechanisms for keeping up to date with technology. Beyond routine conversations with colleagues and the reading of magazines their common approach seemed to be to seek specialist, technical advice pertinent to a given problem, should the need arise.

5.33 Definitions of Technology

7 "Computers and information processing. Not telephones or calculators - they do not have the aura of technology."

8 "There is very little technology in use in my job, it's all sort of steam operated. In connection with the job there is very little technology. You are defining it as a sophisticated piece of apparatus, or methodology which doesn't exist. It is still a pen and quill thing. The nearest thing to technology we have is we borrowed an old Apple II computer for two months and they thought they were going to rewrite the world. Not at all telephones or intercoms, they are standard office equipment a bit like a typewriter. Technology ... in that respect I would class as somewhat more advanced."

9 "The modern application of science to industrial practice. Technology is something that is very current; once it's been in use for a while I no longer see it as technology. Technology is the innovative things."
5.34 Grid Analysis

The reordered grids are shown as figures 11, 12 and 13.

7 The personnel manager seems to group two main sets of constructs, SECRET, ESSENTIAL and INFORMS (as opposed to changes 'ideas). Presumably this reflects the confidential nature of much of his work. The construct ONE TO ONE is linked loosely to this set, as might be expected. The second set seems to relate to the way in which he collects his data, SLOW, produced automatically by his STAFF, LABORIOUS (as opposed to concise). As a set, these constructs are related to NOT PASSING MESSAGES or asking questions and again more loosely as ENDS (rather than means). Once more, this seems to be indicative of the way in which a personnel office generates information.

The only constructs on which a COMPUTER is rated at the poles are, FAST and data collected specifically from OUTSIDE. It is seen as quite, SECRET, ESSENTIAL and INFORMATIVE but not strongly so. There is not much commitment to computers. The manager keeps up to date by reading and by exchanging ideas with his colleagues. Statements about using computers come from head office or the chief accountant but the "problem was how to relate them to problems now. There is not enough detail for managers. The data are technical, not managerial so I do not try to apply it."

Clearly the most isolated elements are,

WAGE CARDS and FILES

which are not closely linked to other technology in the job. The other two pairings are,

TELEPHONE and TELEX,
COMPUTER and STATISTICAL FORECAST.

A personnel manager for an international company would pass and receive many messages. Similarly he would receive many computer
generated financial reports and statements. This pairing is also linked. Access to REMOTE DATABASES refers to labour market information which he uses little at present. This was offered as an element which he did not use but ought to. CALCULATORS, STATISTICAL REPORTS and MEETINGS are loosely related to this set.
FIGURE 11

Group 3 - The Control Group

Manager 7 - Cluster Analysis of Grid by Program MONOCLE
8. By contrast, manager B, the army major, uses computers without reserve in his research and has used them directly in his job. Unrelated to the main construct clusters are the notion MUST KNOW (what you are doing) with NEW (as opposed to old). There appear to be three other sets of ideas the first of which comprises, INCOMPLETE, UP TO DATE and of FIXED VALUE. The second is a link between, FRIENDLY and uses OWN EXPERIENCE and the third is a link between, VERBAL (speech operated was the expression used), SLOW, and low grade personnel, NO TECHNOLOGY. These groupings reinforce the perception of technology given in his earlier definition.

As with the personnel manager there are two elements isolated from the others. These are,

TEXT BOOKS and REFERENCE TABLES.

This refers to army manuals and tables which are used to calculate ration entitlements. The other elements are grouped in two main sets. Set one includes,

MICROCOMPUTER and TELEXES (corps signals),
linked to CALCULATOR, COMPUTER REPORTS and TELEPHONE.

The second set comprises centrally,

FILES and PRO-FORMA
linked to CHECKLISTS, advisory or standing COMMITTEES and AIDE MEMOIRE.

The microcomputer is construed strongly as, LIVE, FAST, NEW, ONE TO ONE which all seem positive. However it is also seen more strangely as LOW TECHNOLOGY and not especially UP TO DATE. These constructs can be explained in terms of the dismissive attitude which the manager holds towards things he understands well.
Group 3 - The Control Group

Manager 8 - Cluster Analysis of Grid by Program MONOCLE

Cluster Presentation of Grid
Subject 8 - 12.85

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Manager 9, the technologist seems in some way to share this way of construing technology. Thus the constructs, NOT FUTURE ORIENTATED, NOT RESEARCH BASED and interpret output AT A GLANCE seem to be linked. Similarly, DISLIKE, UNHELPFUL and NOT USED are brought together along with NOT to do with SALES. A third set of constructs seems to based around being MANUAL (as opposed to automatic), UNDEVELOPED and more loosely, TEMPORARY and ENERGY INEFFICIENT.

This manager has two direct contacts with small computers, at work through his catering information system and at home through his SPECTRUM home computer. Both these elements are construed as, DEVELOPED, PERMANENT and needing to STUDY THE OUTPUT. The SPECTRUM is also seen as, RESEARCH and FUTURE ORIENTATED and the CIS is construed towards those poles. The latter is also seen as more HELPFUL and USED OFTEN.

Again, two apparently pedestrian items are isolated.

BOILING RANGE and FORCED CONVECTION OVEN.

Other pairs are given as,

POINT OF SALES till (POS) and CATERING INFORMATION SYSTEM (CIS)
SPECTRUM and CLOSED CIRCUIT TV
(the Spectrum uses a TV for displays)

The microprocessor based devices such as the POS and the CIS are then linked to WORD PROCESSOR and TELEPHONE, the latter specifically being "not perceived as technology". The calculator seems to fall outside this technological grouping as well.
FIGURE 13

Group 3 - The Control Group

Manager 9 - Cluster Analysis of Grid by Program MONOCLE

Cluster Presentation of Grid
Subject 9 - 02.85

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5.35 Summary of Results from Group 3

Each of these managers is highly educated and exposed to a work environment in which computers are in common use. They each offered a rich pattern of differentiated constructs with little difficulty and were able to recall their recent significant decisions. Manager 9 sees his future as being bound up with more research and this is linked to more contact with computers as research tools in his job. Manager 7 by contrast is bound to computers in a different way.

"When they introduced the central reservation system, they said managerial career data would be kept on it [the computer]. They always said it would be available to personnel - indeed, that all records would be kept that way. I never believed it."

There is a scepticism which is echoed in a different way by manager 8. He has no fears about keeping up with computers or computer technology. He sees few if any personal benefits from the devices, the "main benefit will be company orientated in that your performance will be improved". He seems to share the view that there are no benefits to be derived by way of additional job satisfactions for himself. In response to a question as to whether he was frightened by the prospect of working more with computers, he replied,

"No, not at all. It doesn't frighten me in the least about keeping up, I'm too old. I think I can keep pace with the crowd. The sort of technology that will be presented in a usable format will have been proven already. So it won't be advanced tech' because no other people would be able to use it."

Perhaps this explains the lack of a sense of threat. There seems to be a view that if it is available for use by managers, it cannot be high technology. In any case, more is promised than is likely to be delivered. Some of the sentiments of group 2 are also to be found.

"A computer or whatever is a means of providing the information to make a decision, the ultimate decision in many cases is a value judgement which you make on the basis of the information available."
Once again, speed and accuracy emerged as a benefit from computers but it seems that this group do not see computers as significant devices in themselves. Nor is their perceived sophistication a deterrent to use. The concept of a computer seems to be closed ended and limited. They are things which do a job and provide a human being with supporting information for decisions. This is not threatening. As manager 8 puts it,

"I tend to think of computers not necessarily as advanced technology. Advanced technology at a user level, I would think more of brain scanners, purely because I don’t understand them. ... If I understand it, it can’t be high tech’ ... if its high tech’ they wouldn’t let me near it ... high tech’ is not in daily use’.

However, such views do not offer the prospect of the creative application of computers. There is no sense of using computers in an imaginative way. The perception of a computer as a programmable device is not there and any stimulus that might be derived from work on machine intelligence is potentially lost.

A consideration of these three groups suggests a progression of sorts. Group 1 seems to be committee centred, group 2 self centred and group 3 independent. The computer as a device is and can only be, peripheral to each of these managerial styles. Neither technology push nor need pull is evident. Shamir (86) encountered some difficulty in classifying hotels as organisations in terms of prime beneficiary, technological typology or even function and control. He attributes this to the unstable nature of the environment as represented by guests and the intimate, personal nature of the services which hotels provide. He suggests that hotels adopt a structure which both protects the value system of the controlling group and protects the staff from the anxiety provoked by personal service. It would appear from the results of these three groups that hotel managers are well equipped to cope with such stress as might otherwise be experienced by technology push. It would also appear that need pull in this case must be related to the values of the manager. In the labour intensive, people orientated hotel and catering business these values centre around personal decision making. Computers viewed as devices like
copiers, calculators or report generators do not impinge on this process.

Summary of Initial Results in the Use of Repertory Grid Techniques
For the Investigation of Management Attitudes to Computers and Technology

Shamir (87) provides some evidence to suggest that hotel and catering organisations operate within unusual environmental, task and technological constraints. In consequence they have devised structural solutions which differ in unexpected ways from organisations more easily categorised in terms of service or manufacturing orientation. As an activity, hotel keeping or catering has a foundation which can be seen as fundamentally unchanged and unchanging over decades and perhaps centuries. The nature of this activity is to some extent independent of ethnic culture since the role of hotel and catering organisations is similar in different parts of the world.

The attitudes and intentions of innovating managers were expected to have an important influence on the effect which an innovation might have on an organisation. Repertory grid techniques devised by Kelly were selected to investigate the way in which hotel and catering managers construed technology and computers, as best fitting the purpose of modelling another's view of the world. A descriptive cluster analysis of constructs, based on methods developed by Shaw et al, was chosen so as to try and interfere least with the pattern of constructs offered by the interviewee.

The limited perspective provided by grid techniques require that data be interpreted with caution. However, it seems that the reordered repertory grids produced by the computer program MONOCLE lend themselves to sensible interpretation in relation to the people from whom they were elicited.

The initial analysis was confined to three pre-computer managers, three mid-computer managers and three non-administrative managers used as a control group. The findings seem to suggest that computers as examples of technology are not highly differentiated from other forms of technology that managers use. Thus none of the three groups construe computers as devices central to the way in which they do their jobs. The control group, drawn from an environment in which computers are commonplace,
either disregard them as "high technology" or have a limited conception as to their role. The pre and mid computer managers do not see them as central to the way in which they make decisions either potentially or actually.

What seems to be most significant here is that computers are not distinguished from other forms of technology with which the managers are familiar. This limited conception of computers relegates them to the status of machines like any other machine. That other machines are generally "muscle enhancing" whilst computers may be "mind enhancing" does not seem to be recognised. The computer is viewed primarily as a data processor and its potential for rule seeking, pattern recognition or even reasoning is overlooked. Since management is perceived as a reasoning process there is little or no threat potential. In this sense computers are not even seen as innovations. Thus a hotel manager’s view of technology is a function of the extent to which that technology can be used to achieve some desired future state. The prime benefit to be sought from a computer is generally reckoned to be faster decision making. It does not shape the future state, it is merely a stage on the way.

This perception is reinforced partly by notions of the problem environment in which hotel managers have to operate and partly by the way in which they do their jobs.

The problem environment is seen as largely unstructured, drawing extensively on the use of soft data. There is no recognition that computers might be able to manipulate soft data. The way in which managers do their jobs does not provide a perspective in which decisions can be isolated easily as discrete events. The grid elicitation interviews showed that managers spend a great deal of time on routine, operational decisions of a continuing or recurrent nature and sometimes have difficulty in distinguishing these from strategic decisions. This conforms to earlier studies of behaviour by Nailon (88) who found that management in hotels tend to shift both attention and physical presence from problem to problem and department to department as events might dictate. To encapsulate this behaviour, they are typically reactors rather than actors.
Such behaviour can only be set in context by a more detailed case approach in which decisions related to computerisation or the use of computers in hotels and catering can be linked to other aspects of management control and decision making. Case studies in chapters 7 and 8 will support the repertory grids elicited from managers who have implemented computer based systems, with a more detailed analysis of the extent to which the computers were seen as central to achieving some goal state. The intervening chapters will examine the exercise of management will or purpose, relate the application of computers to management planning and control in hotel and catering and seek to determine if hotel and catering managers' perspective of computers is likely to be different from managers in other occupations.
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Computers and Decision Making

1 The Nature of Decision Making

Stewart proposes a very simple definition of management, "deciding what should be done and then getting other people to do it." (1) From this definition, a manager’s job can be considered in two parts, taking decisions and putting them into effect. Of course, both of these involve organisation as discussed in chapter 2.

Taking decisions is considered by Mintzberg (2) to be the most crucial part of managerial work. There is a vast literature on the subject in which research workers from different disciplines have examined the nature of decision making from their own perspective and made a contribution to the body of knowledge. It is not certain that these many contributions have entirely clarified our empirical understanding of the process. Indeed, Cohen et al (3) used the somewhat fanciful analogy of organisations as "garbage-cans for decision" into which something was dropped and shovelled around. However, there does appear to be a consensus that purely rational models of decision making behaviour are inadequate.

Decision making seems to comprise at least three phases, problem definition, decision taking and implementation. It is not the intention of this research to investigate models of decision making. Rather the aim is to study the possible effects of computers on decision making behaviour and organisations. Thus in the problem definition stage, making decisions about what kind of decision to take, it might be expected that computers (as information processors) will influence the information content of decisions. In the second and third stages, if there is a relationship between information and power, it might be expected that computers will affect the balance of power in organisations along the lines of Salancik and Pfeffer’s (4) strategic contingency model of power.

It was suggested from chapter 3 that the impact of computers on hotel and catering organisations was minimised because of the limited conception
that managers seemed to hold in respect of computers. If a manager does not see a computer as an information processing device but merely as a data processing device, it will not be allowed to affect stage one of the decision making process. Question arise as to whether that perception can be generalised to other types of managers or indeed, whether the information content of a decision is of major significance.

Newell and Simon (5) suggest that problem solving behaviour can be explained in terms of an information processing model in relation to the complexity of the task environment. Thus the complexity of behaviour is a function of the complexity of the environment. This premise implies that the information processing content of human behaviour can be modelled (by a computer) although the worth of an environment free model of this sort is questionable. Hotel managers have to function within information environments which are very complex but they appear to adopt two coping strategies.

The first of these is to call in "experts" to advise them in a specific context. An expert is defined as anyone who may have more domain specific knowledge than a hotel general manager. This may be a housekeeper if the decision is to do with staff uniforms, an architect if the problem is to do with hotel design or an accountant if the problem is one of interpreting finances. There is no single academic discipline upon which a hotel or restaurant manager may draw in order to do his or her job. On the contrary, as situations arise which bring new problems, the manager must be able to select the technique, employ the skill, which is appropriate to that particular case. The situation is illustrated by figure 14.
FIGURE 14

The Multidisciplinary Framework of Decision Making in the Hospitality Industry

After Harrison E.F. The Managerial Decision-Making Process
Houghton Mifflin, Boston, 1975, p41
The second strategy seems to be to ignore large elements of the problem environment. Selective information usage is partly explained in terms of perceived pressure of time, "making decisions I shouldn’t be making unless I had more information but with pressure of time crushing on me all the time I’ve got to make decisions", as manager 5 put it. It may also be explained partly in terms of expert decision making. In the field of machine intelligence Minsky (6) has observed that,

"An expert is someone who knows what to do without floundering around because he has a knowledge organisation that accurately selects what procedures to use and what further knowledge to apply to them." (6)

Experts appear to seek and use less information because an expert is someone who knows what to do whereas a beginner does not. Whilst hotel general managers are experts in their field, it is difficult to define precisely what that field might be. An expert generalist is something of a contradiction. However it may also be that since hotel and catering managers have open to them many ways in which any given problem can be solved, they are more or less indifferent to the way in which they do so.

It seems more likely that hotel and catering managers reduce the amount of information that they use in order to simplify matters. As Stewart (7) suggests therefore, management beliefs and attitudes are likely to have "an important influence on both the type of decision that is made and the speed with which the decision is reached and implemented." The complexity of behaviour therefore is not only related to the information environment but to individual differences between managers. Thus according to Nailon (8), a manager reacts to situations, or to perceived future ones on the basis of his value system, knowledge and skills.

The difficulty remains as to whether the way in which managers limit the scope of a problem is itself a function of the problem environment. Stewart (9) suggests that many managers dislike analysing decisions because they believe that in conditions of uncertainty, flair is more important than logic. The hotel managers interviewed for this research often referred to a body of personal knowledge which they labelled as "judgement" or "experience". This will obviously vary from individual to
individual, so that decisions which are made may not always have objective rationality. Butler et al summarise the position well.

"In short, decision making is an activity which muddles through incrementally within bounded rationalities to merely satisficing and transient ends in a manner that need not be all that consistent or logical." (10)

Stewart goes on to argue that the importance of flair will decrease as the availability of information processing techniques available to managers increases. Interestingly enough, in case studies 3 and 6 where the managers have been categorised as a successful innovators, both managers alluded to the importance of displacing flair by logic. It is therefore important to consider developments in information processing which may influence the basis of decision taking in hotel and catering organisations.

1.1 Data, information and decisions

It is important to understand exactly how information technology might relate to the job of a hospitality manager. In order to do this effectively it is useful to distinguish four phases within the decision making stage, disregarding problem recognition and implementation for the moment. Working backwards, it is clear that the fourth phase is the decision making process itself. Decisions, if they are to have any objective rationality (which is not always the case) are based on information, so the third phase is obviously to do with producing information. Information in turn is made up of data or sets of data which are combined in some way, thus the second stage is to do with the manipulation of data. The first stage must therefore be concerned with the collection of the data itself. The reason for presenting the structure from the top down as it were, is that the decision itself should be seen as the tip of a kind of pyramid, built on a broad information base designed to identify and solve problems. The nature of the decisions to be made affects the information which is collected. The information controls the data and the data requirements regulate the data collection procedures.
From this example some of the distinctions between data and information can be recognised. Data are transformed into information as they acquire structure or meaning. A table of numbers may be described as data. A graph of that table showing trends and patterns becomes information. If the manager has to restructure the items which are presented in order to understand and use it, perhaps by calculating some percentages or by making comparisons with other data, then he or she has not been given information. Most of the work to do with collecting and analysing data is purely mechanical and can be relegated to some machine based process. Within organisations, these activities carry low status whether or not they are carried out by a machine.

Structure is not the only attribute of information however. A definition has to be more complicated than that. The structure or meaning of the information must be recognisable, that is to say it must be perceived by the recipient. The act of perception has two elements in this context. First, the information must be accepted as relevant to the current problem by the recipient. Second, the information must be understood by the recipient. To provide someone with information that they can neither understand nor use, is not going to help them make a decision. The other two important attributes are that the information must be received and that it must be received in time to affect the outcome of the decision that is to be made. A complete definition of information would therefore run along the lines of;

"Information is comprised of data which have been given meaning by a process of analysis and organisation and which have been communicated to a decision maker in a meaningful and recognisable form, in time to affect the outcome of a decision." (11)

The process of interpreting the information in the form of a decision is regarded as more of a social process requiring the application of judgement. Some problems do not lend themselves to an objective answer and yet someone must choose. The manager makes the decision by applying a value judgement. The application of values carries much more status in the organisation, whether it be done by a man or by a machine. "Perhaps because of the higher status associated with decision making, some people may feel threatened and uncomfortable if it is undertaken by a machine. A
FIGURE 15

The Progression of Data to Decision Making

Values Emphasis

DECISION

Information

Information

Information

Data

Data

Data

Data

Data Collection

Data Collection

Data Collection

Mechanical Emphasis

Lower status

Higher status

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summary of the progression from data to decisions is given in figure 15.

1.2 Information Technology and Decision Making

The convergence of three technologies, electronics, computing and communications, all of which are being promoted by the rapid development of microelectronics, together provide a medium for manipulating information in a new way. The term that has come into prominence to describe the joint effects of these disciplines is information technology. The extent to which information technology might be expected to affect an organisation can be judged by the generality of a definition coined by UNESCO, the United Nations Educational, Scientific and Cultural Organisation.

"Information technology comprises the scientific, technological and engineering disciplines and the management of techniques used in information handling and processing; their applications; computers and their interaction with men and machines; and associated social, economic and cultural matters."

Yet it appears, from the limited investigation reported so far that hotel and catering managers are not inclined to embrace information technology in a way that will exploit its apparent potential. One reason for this can be attributed to low levels of awareness as to what it can do. It seems paradoxical that there could be a lack of information about the information revolution. Implied evidence of this problem is provided by British government schemes, such as the Microprocessor Applications Project initiated in the late 1970s, to increase industrial awareness and training. This was aimed at manufacturing industry which might in any case be expected to be more technologically aware, rather than at service industries. However, in 1979 the market research group MORI reported in its study findings commissioned by the Department of Trade and Industry,

"British managers with corporate responsibility for microelectronics see the coming of microelectronics technology as inevitable and a good thing overall, but they do not feel they know very much about it. Over half the executives interviewed confessed to knowing next to nothing on the subject." (12)
Whilst one year later the National Economic Development Council (NEDC) was able to report "a high level of awareness" in manufacturing areas, it was obliged to express its concern that, "by contrast with competitors [overseas], the actual take-up by industry remains sluggish". (13) The NEDC attributed this to a continuing lack of knowledge and understanding in the specific application of new technologies.

Bessant and Dickson (14) have identified examples of three categories of information which might be needed by managers. Technical information would answer questions concerning relevance, system performance and integration and the range of possible technical solutions. Economic information would cover the usual range of capital appraisal techniques applied to any investment decision. Organisational information would cover issues pertaining to the effect on the organisation such as, the effect on employment levels, work patterns, industrial relations, management control and decision making.

The search techniques identified from the nine interviews reported earlier seem unlikely to reveal such detailed information in any systematic fashion. Contact with colleagues equally uninformed about the application of information technology to hotel and catering management will not provide reassurance or advice. There are few technical experts in this particular field. However, the sheer technical complexity facing the hotel manager as a generalist should not be underestimated. As will be observed from the discussion in chapter 5, the range of technologies by which operational problems in hotels may be approached is extensive. For example, a room status system (which reports on whether a room is sold, unoccupied or out of service) can be operated by separately installed electrical relays, electronically monitored through a computerised locking system or controlled through a telecommunications device such as a telephone.

Interchangeability between technical solutions not only increases the information required to make an decision but it complicates the nature of the decision to be made. According to Kowalski, Professor of Computational Logic at Imperial College London, having more than one way to solve a problem means that you do not know how to solve it. (15) Paradoxically, most decision makers consider themselves fortunate if they
have more than one solution at their disposal. This aphorism has a broader applicability than the use of logic programming in computers. Equal indifference to solutions based on an absence of data is insuperable in an absolute sense, however, it may be overcome if preferences based on values are applied.

A second set of reasons why hospitality managers may not embrace the application of information technology may be to do with the way that they construe it. Given a long historical perspective for the functioning of a hotel or a catering outlet and given a perceived lack of relevance of computers for decision making (as opposed to data processing) it may be that managers are taking a predetermined view of the problem environment.

Hedberg et al (16) observed that organisations which were disinclined to be adaptive tended to see the environment as static, constraining and minimally benevolent because they discounted (ignored) changes that were occurring there in the form of either threats of opportunities. This perception becomes self confirming because such lethargy discourages opportunities from being presented, since they are rarely exploited. Pondy and Mitroff (17) also note that protecting an organisation from exposure to environmental diversity while reducing perceived internal complexity may also reduce its adaptability. To some extent this is a function of a loss of contact with the environment.

In the long run such a loss of contact should lead to failure, as the organisation fits less and less well with its environment. Certainly a decline in the competitiveness of British manufacturing industry has been observed by many commentators. The hotel and catering sector does not seem to be suffering in this way as shown by turnover figures described in table 2 of chapter 1. Aldrich (18) offers two possible explanations as to why natural selection may not affect some organisations. He points out that large, commercial businesses rarely fail due to their dominant position in the market place and that those in the public sector are often protected by government. Small businesses fail much more often but may be protected because chance or conflict amongst competition may fit them for a particular niche at a particular time.

To these must be added the peculiar circumstances of the hotel and
catering sector in the mid 1980s. In the first instance, neither a
national nor an international scale of competition is affected by
a differential, technological advantage. Hotel products are not
differentiated by technological factors in a manner that affects the
method of delivery, price or even the product. Hotels in one location are
not affected adversely by the use of information technology in another
location. Few hotels in any country make use of information technology.
In any case, this may not be a significant factor in buyer behaviour. The
consumer goes to a hotel or a restaurant partly to derive social
satisfactions and objective comparisons between products are difficult.
This situation is quite unlike that of manufactured goods. Items such as
cars and domestic appliances from many sources can be compared
objectively. A manufacturer who has used technology to reduce price and
improve quality has an advantage.

In the second instance, hotel and catering organisations are well used to
buffering themselves from reality. As Shamir (19) has noted, the
demarcation of work in some service situations is neither rational nor
functional. To have separate waiters serve food and wine or even food and
coffee to the same customer can not be efficient. Many ritualistic
procedures for the provision and consumption of products in a hotel or
catering environment have no rational end/means relationship. For
example, there is no sensible reason why Edwardian styles of dress should
be associated with high status service or why food should be served with a
spoon and fork instead of a scoop. It is clear that functional efficiency
is not a primary consideration.

Thus the application of information technology is not selected as a
problem which hospitality organisations wish to "solve", that is, it is
not seen as part of the problem environment. Starbuck (20) believes that
organisations typically exclude many environments from consideration and
thus impose unconsciously, many constraints on what they may choose to do.
Starbuck's explanation for such behaviour, suggests that it is
attributable to a high degree of imitation of others' choices and to the
processes of incremental change.

A rational and comprehensive approach to decision making in organisations
would avoid such unreflective narrowing of choices. It would begin by
clarifying objectives, followed by a careful separation of ends and their associated means. Every important factor would be taken into account and any proposed solutions would be tested against a theoretical framework before they were implemented. In practice, as Lindblom (21) describes in his paper, *The Science of Muddling Through*, management problem solving tends to progress in a series of successive limited comparisons, rather than by a rational comprehensive examination of issues. Selection of goals is not separated from associated values, thus a means-end analysis cannot be used. Important possible outcomes are neglected, important alternatives ignored, important values set aside. The test of a good policy becomes one on which most people agree. Starbuck concurs with this view by pointing out that organisations make choices incrementally, introducing change only to those areas which are threatened. Pursuant to these ideas it might be postulated that information technology does not trigger change in hotels because managers choose not to detect gaps in their own performance.

If the technology is not seen in terms of a problem, it could be equally attractive if it were viewed in terms of a solution. Following the analysis of Cohen et al mentioned above (22), it appears that managers may redefine problems in terms of solutions which they strongly value. For example, Cyert (23) describes a case in which new equipment was introduced after an accident even though the existing equipment was not clearly identified as a cause. In this case, both workers and managers were already aware of and preferred the new equipment. Similarly, Pettigrew (24) reports a situation in which the management services department of a firm and computer sales people collaborated to convince senior management that more information processing capacity was desirable. In both cases the authors write of the problem solving process as a kind of mating in which desired solutions seek out matched problems. (25, 26) If values have a part to play in resolving equal indifference, as suggested above, they are clearly of crucial importance in influencing the perception of a situation in terms of preferred solutions. Values may be defined as,

"... conceptions of desirable states of affairs that are utilized in selective conduct as criteria for preference or choice or as justifications for proposed or actual behaviour." (27)

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If information technology is to be introduced into the decision making process in hotel and catering organisations it seems clear that the trigger will have to be a change in management values. As Kaufman has it,

"... in the last analysis, all influences on administrative behaviour are filtered through a screen of individual values, concepts and images. ... To the extent that leaders of an organization can manipulate the screen, they can increase the receptivity of field personnel to organization directives ... " (28)

The problem can be considered in two dimensions. First the possible application of computer based procedures as part of a decision support system for managers. Second from the point of view of computers as technological innovations introduced by managers to affect the operational procedures of the organisation. The latter may be viewed as akin to a new manufacturing process in a factory.

2 Decision Making and Information in Hotel and Catering Organisations

If computers as devices which organise data into information are to constitute an important part of a decision support system, it is apparent that decision makers must address problems in some formal style. That is, if a manager is to value "better" information and by implication devices that provide it, then he or she must be accustomed to using some sort of systematic approach to solving problems which involves the use of information. Some kind of scanning model along the lines proposed by Aguilar (29) could then act as the basis of a management information system. From the interviews carried for chapter 3, it is clear that this is not always the case. Some managers have difficulty in isolating decision points, others cannot separate important decisions (intermittent, tactical or strategic) from routine decisions.

The extent to which managers of hotel and catering organisations formally seek out and use information for making decisions is not at all clear. Indeed, the extent to which they formally seek out and address discrete problems is not all that obvious. Unstructured conversations with four groups of hotel and catering management undergraduates at the University of Surrey support this speculation. Each of the four groups, representing
a combined total of some eighty man/years of work experience, was asked to offer an example of management problem solving that they had observed during the one year work experience programme that forms part of their degree course. Examples were offered with difficulty and those that were given bore little objective examination as formal approaches to problem solving.

Thus the new manager of a restaurant in a large hotel had determined to change the product without any formal market research. In another hotel, a manager had initiated some training for switchboard operators because his telephone calls were answered too slowly during a week when some guests had also complained about speed of response. The representativeness of the situation was not formally assessed, there was no traffic study undertaken to examine whether it was physically possible to answer calls more quickly and in any case, the type of training given focused on how to answer the telephone rather than on methods for answering it more quickly. In a similar example at another hotel, a front office manager had introduced pre-printed direction cards after observing a receptionist who was unable to direct guests to a nearby restaurant. Again, there was no formal assessment of the representativeness of the problem. A solution was implemented without reference to its impact on other receptionists or the extent to which pre-printed cards might depersonalise the service offered to guests.

Problem recognition as a stage in decision making warrants further study. It would appear from the examples given, that there are situations in which managers choose to solve either a sub-problem which is within their range of competence or an invented problem that will be valued for its own sake. Thus a traffic study of a telephone switchboard or a careful collection of examples of the number of unanswered guest enquiries at a front desk is both difficult and time consuming. While the data are being assembled there are no outward signs of activity that can be judged by other managers. Similarly, changing a restaurant to improve turnover is "good" in that any activity orientated to improving turnover is likely to be valued. Such illustrations are not atypical in the literature. Mitroff and Betz (30) refer to the need for a theory to deal with errors of solving the wrong problem, though it is evident that some care needs to be taken in the perspective of value judgements about rightness. Nor
would Barnard have been surprised that the students were unable to pinpoint decision situations.

"Not least of the difficulties of appraising the executive functions or the relative merits of executives lies in the fact that there is little direct opportunity to observe the essential operations of decision. It is a perplexing fact that most executive decisions produce no direct evidence of themselves and that knowledge of them can only be derived from the cumulation of indirect evidence. They must largely be inferred from general results in which they are merely one factor, and from symptomatic indications of roundabout character." (31)

2.1 Stages in the Decision Process

It is noticeable in their analysis that Minztberg and his colleagues (32) do not distinguish decision types between strategic and operational. Their definition of strategic, which is acceptable here, is simply that the decision should be considered important. They offer three ways of categorising decisions by stimulus, solution or process. In each of these categories it is apparent that the formal organisation of management information systems is important for only some types of decision. Stimulus decisions are described as either crisis, opportunity or problem. Problem decisions merely being defined as those which are evoked by neither a crisis or an opportunity and which correspond generally to operational decisions.

Types of solution are broken into four, based on the method by which solutions are derived. Thus there are decisions in which the solution is given at the start, those where a fully developed solution is discovered ready made during the decision, custom made solutions and finally modified solutions which combine elements of ready made and custom solutions. The writers classified 14 out of the 25 decisions that they studied as being custom made, though this classification is not particularly useful in studying the process. It seems to refer to the extent to which the solution had to be specified by the decision makers, rather than the novelty of the decision making process itself. Thus a hotel's decision to install a supper club which has to be newly constructed is described as custom made, though neither the decision or the process is likely to have
been novel for the hotel.

The process of decision making offered by Mintzberg and his colleagues, although it does not incorporate the stage of implementation, is most useful for considering the relative importance of soft data. Following their scheme, which itself is drawn from several sources, the seven main stages in a strategic decision and their associated sub-processes are shown in figure 16.

The process by which the need for a decision is identified is not well understood. Even the crisis or opportunity paradigm is not entirely satisfactory since managers may sublimate either into a problem and therefore by implication a more routine situation. Mintzberg et al seem to accept the problem/solution matching phase as a significant part of problem recognition, as put forward first by Cyert and then by Pettigrew.

"An interesting phenomenon in recognition is that of matching. A decision maker may be reluctant to act on a problem for which he sees no apparent solution; similarly he may hesitate to use a new idea that does not deal with a difficulty. But when an opportunity is matched with a problem, a manager is more likely to initiate decision making action." (33)

The rate at which the need for decisions is recognised is explained partly as a function of "busy-ness", a busy manager having less need to seek out problems. Diagnosis of problems also seems to be hard to isolate and in Mintzberg's paper was not observed in every case. Given the circumstances that have been described, there seems little imminent prospect that hotel and catering managers will recognise information technology as a solution to which they can match a problem.
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The development phase is described as the heart of the decision making process. Mintzberg takes Cyert and March (34) rather than Aguilar as the basis of his search model and proposes that managers will proceed from passive to active search modes. This approach assumes some escalation of the search activity in response to the difficulty of finding solutions which does not seem generally acceptable, since it fails to account for predispositions to creativity or to the use of information in decision making. However, Mintzberg reports on observing a movement from a passive to an active search for information, with an emphasis on passive search modes which draw heavily on informal sources.

The range of solutions that are considered depends on the extent to which they have to be invented. Mintzberg reports on a factoring process by which managers solve a series of sub-problems as they grope their way to a final solution. Completely original solutions are both expensive and time consuming and there appears to be a tendency to draw on ready made answers if at all possible. Should this prove unworkable, only one original design is followed through to a conclusion. The style of this phase again seems to mitigate against innovative and original approaches.

The selection phase is reported as drawing extensively on soft data. Screening is described as a superficial procedure included mainly to eliminate infeasible alternatives. Although evaluation and choice preoccupies most of the literature, Mintzberg found it to be of little relative importance for decisions which were custom made, where it assumed the stature of a trimming exercise. The most favoured form of evaluation-choice appears to be based on judgement, principally because it is fastest. The Mintzberg study reveals very little use of analytical choices except where technical decisions were involved and little evidence to support the notion of utility functions. This description corresponds almost exactly with the language used by managers interviewed for this research reported in chapters 3, 7 and 8.

". . . the selection of strategic alternatives requires consideration of a great number of factors, most of them 'soft' or nonquantitative [sic]; as a result . . . the evaluation routine is in practice a crude one. A plethora of value and factual issues, few of them concrete, many involving emotions, power, and personality must be.

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Authorisation seems to do little to rationalise the sequence by which a decision is reached and seems to accord largely with the 'I propose, they dispose' view expressed by manager 6 in chapter 3. According to Mintzberg it is largely a binary process, accepting or refusing the whole solution. It is often made under conditions of limited time by people who do not fully comprehend the proposals put to them. Thus the "comparative ignorance of the [senior] manager is coupled with the inherent bias of the sponsor [of the solution]." (36) The phrase 'comparative ignorance' is not intended to imply incompetence. Solution proposers may have marshalled a closer working knowledge of a problem situation than the authorising manager. In supporting this position, Mintzberg draws on early work of Pettigrew (37) and the findings of Carter (38, 39).

On balance therefore the thrust of the Mintzberg, Raisinghani and Theoret's paper suggests comparatively little emphasis on formal procedures, quantified analysis and objective assessment of hard data. An objective progression from identification of problems, development of solutions and selection from alternatives, in the classic style of the literature on management decision making, was little evident. Instead the process seems to comprise more often than not of attempts to factor complex problems into simpler, familiar problems, a search for ready made solutions acceptable to coalitions of work groups and the use of intuition to confirm choices.

The supporting routines labelled under, decision control, communication and political routines merely serve to reinforce this perception. Decision control, analogous to the operating system of a computer, is implicit to the way in which managers set bounds to the problem space and direct attention to different stages of the decision. Communication may be likened to an input/output process. It is mainly concerned with collecting and disseminating information about progress.

The political routines are reckoned to be of considerable importance and serve to clarify the power relationships in the organisation. Comprising mainly bargaining and persuasion, political activities are most active.
either in situations where individuals see themselves directly affected by outcomes or in situations where the decision is spread over a long period. In general, the more important and contentious the decision and the more that choice rests outside the organisation, the greater the emphasis on the political activities. Political routines may in some circumstances be seen as enabling routines, allowing the decision maker to work towards a solution despite hostility from the environment.

The dynamic factors have little direct bearing on the nature of the decision. They are used mainly to regulate progress, allowing managers to fit activities associated with one decision process to others in which they are involved. Speedups and delays represent a kind of informal, dynamic scheduling symptomatic of the "groping, cyclical process" which is strategic decision making. They are also evidence of a manager's ability to affect the pace at which a decision is made, if not its actual nature. As such dynamic factors may be regarded as an aspect of the political process, being an example of the unobtrusive use of power. Bachrach and Baratz (40) noted that managers who wished to maintain the existing state of affairs in an organisation might attempt to suppress issues by failing to raise them at formal meetings or by seeking to influence employees indirectly by manipulating "dominant community values, myths and political institutions and procedures." (41) Modifying the form of the decision or attempting to suppress it completely are other examples of strategies which seek to further non-decisions.

3 Factors Affecting the Use of Information in Information Systems

In terms of the propensity of hotel and catering managers to use computers as information generating devices, the implications of Mintzberg's findings offer three plausible factors which may obfuscate innovation issues. The first is that the information used for making a decision may have no direct bearing on the problem, though it may have value for the decision maker. Second, the decision process may be influenced at any one of a number of stages by any actor who is likely to be affected through changes in the present state of the organisation. Thirdly, it can be argued that organisations are in any case political contrivances within which powerful individuals or coalitions seek to exercise control. If these elements are set in the context of the problem environment which
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confronts a hotel and catering manager, or indeed perhaps any manager, a certain indifference to a computerised information system may be better understood.

3.1 The Content Versus the Non-Content Value of Information

The effect of information on management decision making will vary according to both the nature of the information and the nature of the individual. The same information given to two different managers may result in different outcomes. Thus it is possible that one manager, perhaps having experienced the failure of a computer system may be disinclined to place much credence in computer generated data. Another manager with a different background may be prepared to give the data a more favourable reception. Information, in so far as it affects management behaviour, cannot be evaluated entirely in the context of the problem to which it relates. Clearly the previous experiences of the individual, his or her personal goals and the way in which that person relates to others will all have an influence. Whilst not dismissing influences at the individual level, general consideration of the role of computers in decision making argues for a focus on the balance between the message and the non-message content of information.

The message content of information has a value in respect of the manager’s store of factual knowledge. This may be supposed to influence the rational aspects of decision making following the model proposed originally by Simon (42). In the procedure outlined by figure 16, it may be expected that the message content of information will affect problem recognition, selection and evaluation of alternatives and the determination of choices. That causal links are difficult to establish between the links of this chain can be explained by the phenomena observed by Mintzberg. There appears to be no way of deciding how a particular piece of knowledge will eventually affect the decision that is made.

According to Edwards and Roxburgh (43), the non-message content of information may also affect the nature of a decision for at least six separate reasons.

a) The source of the information will affect its perceived importance.
Thus information from a superior will carry more weight than that from a subordinate. Speculatively this might be extended to include a superior's perception of the source. If the superior does not value computer generated information, the subordinate may be less likely to do so.

b) The extent to which the information is available will affect action tendencies. A widely distributed report may encourage action on the basis that levels of awareness will be high. This presupposes that such actions are equally apparent to all recipients which would not always be the case.

c) Starr (44) has suggested that restricted information implies privileged access and therefore higher status. Thus personal prestige is enhanced if privileged information access is allowed. On a computer system, status enhancements of this type can be very overt since the computer can be programmed to prompt for passwords and to restrict access as required.

d) Information about the organisation as a whole may affect the nature of decisions by providing knowledge that would not otherwise be available. This may affect any aspect of the decision process. A manager aware of shifts in organisational objectives may alter the kind of situations that he or she is prepared to recognise as problems.

e) Information may act as a reminder to act or give an indication of the relative importance of a problem. Frequently repeated instructions may be interpreted as being more urgent and important than those which are allowed to lapse.

f) Finally, information may yield an opportunity value to managers which is of psychological value. Being on the same circulation list as the general manager carries status which may be used as a power base.

Since the non-message content may have an important bearing on the use to which information is put, considerations of information systems purely in terms of knowledge generation are bound to overlook important issues.

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Computer systems in hotels are predominantly driven by keyboards which are operated by clerical and secretarial staff. The product surround of any information generated by the computer may therefore carry low status, particularly if the computer itself is regarded merely as a data processing device. Status can be conferred by restricted access, senior managers or technical expertise. Since the former is somewhat counter productive, it would seem that changes in attitudes and increased technical competence are the keys to computer innovation in the hotel and catering industry.

3.2 Middle Managers and Incremental Change through Control of the Decision Process

A passive view of the role of information must be tempered by an understanding of the actions of managers who may seek to influence the process of decision itself. This may be a particularly subtle form of power used by organisation members who are not in a position to control the organisation more directly. Mechanic (45) saw access to each of information, people and resources as important sources of power for subordinates in organisations. In particular social networks in the middle of organisations can bring about change gradually. Following these ideas, Lee (46) has suggested that such influence can take several forms.

a) Although important decisions are taken by senior members of the organisation, it is often junior managers who are instructed to assemble and present the data on which the decision is based. There is an opportunity to bias the decision at this stage by affecting both the information that is presented and style in which it is presented. The range of choices offered as possible alternative solutions may also reflect some early filtering.

b) By a similar process, problem recognition may be altered. If senior managers are alerted to the existence of situations on a selective basis this will determine their awareness of problem situations and the subjects about which decisions may be made.

c) The nature of the decision process itself can be affected by the parties who are involved. Packing a committee with allies or choosing to omit an influential opponent from the circulation list...
are examples of tactics used to influence the decision process indirectly. Constraints can be placed on the extent to which counter arguments can be marshalled or views canvassed by controlling access to resources for obtaining information (such as money) or by setting tight time schedules.

A great deal of change in any organisation occurs incrementally. The replacement of one employee by another, a marginal change in the procedures for dealing with a particular task, an obsolete piece of equipment is substituted by something more modern. It is at this level that it might be possible to observe the effects of middle management influence on decision processes. Particularly in the case of the hospitality industry with its high labour turnover, the constant reformation of work groups might be expected to demonstrate the workings of incremental change.

During the course of this research, phenomena of this type were observed in relation to the introduction of computer based catering systems. At one level it may be argued that the cost and high profile of these devices precludes their introduction into hotels or restaurants other than as the result of a formal decision. However, the ethos of the industry is focused on a cycle of limited planning and short term problem solving. A highly visible management performance is called for, based on long working hours and little formal problem analysis. There are few expectations on the part of managers that operating procedures will function as intended in the absence of close supervision. Such fragile systems also confer great personal power on the one or two individuals who are able to make them work. Thus it may be that attempts to systematise departments on an incremental basis by junior staff are quickly thwarted by department heads to protect this power base.

The point may be illustrated in connection with hotel banqueting departments. Each banquet sold by a hotel is to some extent uniquely tailored for every sale. At the same time, there is a great deal of routine activity. Standard texts are required for letters, lists, contracts and memoranda. Several filing systems are needed to keep booking diaries, guest histories and details of trace actions (follow up steps) as each sale is made. Much numerical calculation is required to
develop business plans and to cost individual functions. These are all activities well within the technology of the many business microcomputer systems available for under £4,000 equipped with a word processor, database manager and spreadsheet. The banqueting turnover of almost any commercial hotel with 100 bedrooms or more would easily justify such an expense and it would be within the province of a banqueting manager to obtain it. However, at the beginning of 1986, as far as can be determined, only one or two hotel banqueting departments in England have installed such a device. Yet in hotels of 100 bedrooms, the installation of computerised front office systems has reached market saturation. Middle managers in hotels, unlike the middle managers in the large catering organisations interviewed for this research, do not seem predisposed to introduce computer technology.

3.3 The Politics of the Dominant Coalition

The differences between the two sets of managers may be partly explained by the nature of the political influences to which they are exposed. Hotel general managers, responsible for strategic decisions such as the installation of a front office system are exposed to boards of directors who bring pressure to bear for the use of modern business systems. The catering managers in hospitals or in the army are directly exposed to administrators accustomed to dealing with a technologically orientated organisation. Banqueting managers, like other middle managers in hotels, have direct contact with more senior managers who do not construe computers as relevant to routine hotel decisions, as indicated by the findings in chapter 3.

Child (47) has criticised some organisational studies on the grounds that they have disregarded the actions of power brokers. He suggests that they are working "at one remove" by attempting to explain organisations without taking account of essential political processes. Whilst dominant coalitions at the top of an organisation might be considered to have a substantial power base, deriving from several sources, strategies for directing organisations by a political process date back some years. Perhaps the best known of these is Niccolo Machiavelli's classic sixteenth century work, The Prince, the ethical basis of which is sometimes regarded as questionable.
More recently, other authors have contributed advice. In 1956 for example, Martin and Sims (48) offered several guidelines to actors in the political field of management. These include; learning to withhold or release information until the moment is opportune; developing an outward appearance of confidence; avoiding close friendships but adopting loyal proteges and involving others in decisions only when you need them. Hunt (49) later added acquiring the values, attitudes and behaviour codes of those with power even to the extent of cultivating their personal friendship through the use of your family; joining growth departments rather than those which are in decline and acquiring expertise that the organisation requires - preferably in advance.

Opposition to the introduction of improved information systems in a hotel or catering organisation may be offered either by subordinates or by senior managers of equal power. In this situation the protagonist who mobilises his or her power base most rapidly may be expected to prevail. Lee and Lawrence (50) suggest five types of strategy which may be adopted.

a) The push strategy is based on both direct and indirect coercion. This represents the overt exercise of power through the application of rules and sanctions. Its use was not observed in this research.

b) Pull strategies are associated with inducements of some kind. Occasionally they may be a function of charismatic leadership but more usually they are based on the promise of reward, typically money or advancement.

c) The third strategy, persuasion, is a mixture of push and pull. Persuasion strategists seem to advocate a more or less equal mixture of flattery and implied threats.

d) Preventative strategies owe their theoretical base to Bachrach and Baratz. Here the intention is to avoid a decision either by excluding it from the agenda, failing to recognise it as a problem or distracting attention from it. Many of the behaviours of the managers in this study may be categorised under this heading. The strategy represents a form of resistance to innovation which is very
difficult to overcome. By refusing to detect gaps in their own decision making performance, hospitality managers are rejecting the need to confront the issue of better information systems.

e) The last strategy is labelled as preparatory though it might be retitled more descriptively as opportunist. It is associated with attempts to predetermine decision outcomes by recognising the contingent aspects of power. The time, the circumstances and even the territory (the manager’s own office) can be chosen carefully so as to predispose members of a coalition to decide in favour of a particular issue.

If senior managers in hotel and catering organisations are to make more extensive use of computer innovations, there is clearly a need for them to judge the circumstances in which it is introduced carefully. Corresponding to the idea of a dominant coalition, Legge offers the idea of a dominant ideology and suggests that the power of a manager to implement policies in which he or she believes is dependent on a range of factors which include,

"the organisation’s dominant ideology; the areas of contextual uncertainty it defines as being of crucial importance to resolve; how it defines, measures and evaluates sources; the manager’s own level of expertise in the areas of activity he undertakes; his right of access to those he needs to influence and from whom he requires information in order to design and implement policy; his ability to establish credibility with those individuals he seeks to influence and from whom he seeks support; the resource power his position demands." (51)

The key issue seems to remain the value system of the senior managers concerned. Many writers, such as Lee (52), see the dominant ideology of organisations as a transient thing changing in response to the needs of the individual and to group functioning. That may indeed be the case though it seems unlikely that the rate of change will be rapid. England describes a personal value system as,

"a relatively permanent perceptual framework which shapes and influences the general nature of an individual’s behavior. Values are similar to
attitudes but are more ingrained, permanent, and stable in nature. 'Value' as used here is closer to ideology or philosophy than it is to attitude." (53)

3.4 Summary of the Role of Information in Information Systems

It is apparent that the design of an information system must do more than simply facilitate access to information. Mintzberg's findings that managers make extensive use of soft data are not contradicted by the interviews carried out for this research. Within the decision process, objective information fulfils a number of requirements, only some of which are directly related to changing the state of the current problem environment. Information is also used to enhance and support the status and power of the manager who has access to it. Information may therefore serve political purposes to do with other aspects of organisational behaviour.

Improvements in the design of information systems may be initiated incrementally by middle managers. Such gradual change is not evident in the hotel and catering industry. Revolution as opposed to evolution would appear to be the order of the day. Thus there must be a perceived requirement by the dominant coalition for "better" information, a requirement that does not seem to exist. Indeed, there is some indication that senior managers are manoeuvring politically to avoid making decisions in this area.

An alteration in the rate of innovation would seem to require a radical shift in the nature of the environment in which hotel and catering organisations function. It seems unlikely that the personal value systems of senior managers will change for any other reason in the near future. Such changes in attitude will need to be accompanied by alterations in the dominant ideology of hospitality organisations if an innovative approach to the application of computer based information systems is to be successful. Mumford has argued very strongly for a sociological involvement in the systems analysis that precedes the introduction of computer systems. She describes three possible approaches to the design of information systems, each progressively requiring greater involvement from the work group which is to use them. These stages she labels as,
consultation, representation and participation. As to the latter, she suggests that the work group more or less design its own system.

"...no one has the right to design a work system for someone else...the role of the expert should be to help the worker to design his own work system." (54)

Clearly this requires a great deal of commitment from the management group. Existing management information systems acquire a great deal of inertia. Ghani and Lusk (55) report some thought provoking results in their investigation of the effect of a change in information representation on management decision performance. In experiments with university undergraduates, they found that subjects expressed a strong preference for the information representation that they used initially, even after having seen or used an alternative. Increases in the amount of information and increases in the amount of information accompanied by a change in information representation, both led to an initial deterioration in decision performance. Having adjusted to the increase in information or the change in representation, the subjects eventually used more information to attain the same performance as before. Nor did they find any support in their experiments or in the literature that graphics were categorically superior to tabular forms. None of these findings were attributable to individual differences.

The prognosis from these results is not encouraging. The organisation structure, management style and operating environment of the hotel and catering industry all mitigate against incremental change from lower management levels. Low levels of technical expertise and low levels of direct involvement with computer systems are likely to limit the commitment of senior management to a greater use of computers for strategic decision making. Acting to reinforce these factors is the likelihood that short term performance will actually be impeded by the very outcomes that computers will probably be utilised to produce, more information and a varied representation of data.

4 The Politics of Technological Innovation in Organisations

The notion that new technology can be introduced into organisations by
some sort of painless evolutionary process is attractive. Writers have attributed adaptive behaviours to several possible stimuli including, organisation structure, growth, ageing, technological innovation, environmental change, leadership style and even dissatisfaction of a deprived group. Much of this work emphasises the initiating cause and the evolutionary nature of the change that results. However, it may be particularly appropriate in a study relating to the hotel and catering industry to reconsider the old adage about eggs and omlettes.

There appear to be no forces at work in a hotel and catering organisation, nor possibly in other types of organisation, that will introduce change other than through the committed intentions of middle or senior managers. Innovation of this sort will require a very deliberate act, an act of destruction. In a study reporting on the reorganisation of the United States Post Office in the period 1970 to 1971, Biggart points out that,

"... the destructive process must either precede or exist simultaneously with the creative. This act of undoing is important theoretically: reorganization presumes the rejection or supercession of old methods in favor of the new and the organization must systematically destroy the former, competing structures before it can successfully implant the new." (56)

In Biggart's study, she notes that change was triggered by the complete breakdown of the United States' main sorting office in Chicago. For a computer, this would be described as a catastrophic system failure. The sequence of actions that followed this failure involved a reorientation of the US Post Office from a government department to a commercial organisation. Destruction of the old organisation took the form of intensive internal propaganda in an attempt to change employee attitudes, indoctrination of staff, a public relations campaign intended to minimise complaints from government, the replacement of some 4,000 senior managers and conversion of the work force through large pay rises. These changes seemed to satisfice the work force and government but left the organisation uncompetitive because of the new pay levels.

Noting these manipulations, Biggart draws an analogy between an organisation and a political state. Whilst not seeking to over extend the
analogy, she suggests that targets for destruction in the change process will vary according to circumstances and will be those that,

"... pose the greatest threat to the organization and can be part of the formal structure, loyalty system, technology or leadership, or a combination of such factors." (57)

Biggart envisages change as a factor that disturbs the inherent equilibrium of interests within an organisation, the alteration of which results in a dynamic, complex and multidimensional struggle for domination.

Pettigrew saw decision making as a power struggle very clearly.

"By their ability to exert power over others, individuals can maintain structures as well as the norms and expectations on which these structures rest. An individual's behaviour is therefore governed by his ability to shape and mould that structure to suit his own interests. He can do this only if he has sufficient power to impose his will on others despite their opposition. Within decision-taking processes, power strategies are employed by the various interested parties through their demands." (59)

Pettigrew's "demands" refer mainly to attempts to control resources. His study, undertaken between 1966 and 1969, traces the efforts of a group of programmers to retain their status against a group of systems analysts. The programmers tried to protect their status by controlling information as a resource. To support their power base they; created norms which denied the competence of outsiders; created myths about their own special skills and about the problems of working to time pressures; kept details of their work secret by not writing things down or by not training other departments how to use the computer and fought to maintain control over recruitment and training policies. Pettigrew concludes from his research that decision making is not so much a process of balancing goals and means or a choice process delimited by environmental circumstances but a political process that balances various power vectors.

Pettigrew draws comparisons with a study undertaken by Crozier in 1964, shortly before his own work began. Crozier (59) reported his
investigation of a French tobacco company in which maintenance engineers also exploited a power position based on control of technical resources. Machine breakdowns in the plant represented the only unpredictable element in the production system. The engineers took advantage of this by refusing to document repair procedures and by training new engineers orally. Consequentially, their treatment by management was highly deferential.

Other writers have noted similarly that technology can be a source of power because it creates dependencies. Perrow (60) observed that new treatment and diagnostic techniques gave doctors in general hospitals great power because only they understood them. Galbraith (61) has argued that the technostructure in technologically sophisticated organisations have a power base since they control the information which is the basis of management decisions. Kervasdouë and Kimberley (62), also reporting on hospitals, have noted differences in patterns of innovation related to attempts to gain political ascendancy by different groups.

This has led some writers, such as MacMillan (63) to conclude that it is as important for managers to be as aware of political behaviour between organisations as within organisations. MacMillan poses a view of an individual who seeks to increase his influence in the organisation by combining with others who would like the organisation to move in a particular direction. Alone, the individual has little power, as part of a coalition, he or she has more support.

Mangham (64) expresses this idea from a perspective based on organisation man as an active initiator rather than organisation man as a passive reactor. People are seen as goal seeking, pursuing goals which are not necessarily integrated with those of others. Parallels can be drawn between this view and Penrose's (65) perspective of the purposive manager. Most commentators see political behaviour on the part of individuals as being motivated by self interest. Pettigrew (66) considers it an attempt to make a claim against the resource-sharing system of the organisation. Hegarty (67) envisages political behaviour as a byplay which occurs when people want to advance their own ideas, regardless of whether this will help the company or not. Dubrin (68) explicitly regards political manoeuvrings as an attempt at self aggrandisement which connotes a degree
of deception and dishonesty.

There is little or no reason to suppose that decisions relating to the introduction of technology are any less political or any more rational than other types of organisation decisions. Perrow's (69) report on technological developments in certain hospitals documents the manner in which technological developments were used to serve the financial and power interests of doctors. Similarly, Hoos (70) describes how systems analysis became fashionable to the extent that it was imposed mindlessly and in some cases inappropriately to a wide range of governmental services in the United States in the late 1960s. Yet the literature on the political environment of managerial decisions is decidedly thin. Indeed, the literature that specifically addresses the link between values, ideologies and decision taking is very sparse. Perhaps this is what led Warwick to complain in 1975 that,

"one can even now read through thousands of pages of 'general theory' on organizations without encountering a single reference to, external influences. For example, an otherwise useful book by David Silverman entitled The Theory of Organizations (1971) almost totally disregards the political environment in the conceptual framework proposed." (71)

It is not clear why Warwick chose to single out Silverman. His complaint may be due partly to the nature of the literature on which his work is based. His examination of European sources appears to be confined to only one or two texts and does not include Pettigrew or even Crozier. His omission of Crozier is most curious since Warwick was also writing about bureaucracy. On the other hand he also omits Perrow's work despite the fact that Perrow was asked to comment on the manuscript.

For all that, Warwick's point rings true. Particularly in the context of technological innovation, there is a tendency to avoid discussion of political or ideological issues. For example, neither the first or second edition of Twiss's (72) books on Managing Technological Innovation deal with any political or ideological issues. The style adopted bears the marks of the underlying assumption of much innovation literature that technological change is progressive and therefore to be associated with
good management. A further characteristic of such literature is that it is rooted in manufacturing and process control industries. Little if any research has been done to examine the basis of technological innovation in service industries.

Wilkinson (73) has documented some interesting findings in an investigation of The Shopfloor Politics of New Technology. Again, his studies concentrate on manufacturing industry, mainly in the area of numerical control of machine tools but with one or two examples of computerised scheduling and ordering. Like Pettigrew, Wilkinson concentrates on the impact of technology on a work group. He reports on situations where the technology will have a major effect on the way in which a process is carried out. The technological innovation is being introduced by management for particular purposes.

Wilkinson notes that,

"arguments from (sic) efficiency can be used by the various interest groups in order to justify, or make legitimate, choices which are essentially political, both in motivation and consequence." (74)

( The words underlined are italicised in the text.)

He argues that many of the justifications for technological innovation are spurious. These rationalisations are often couched in terms of greater efficiency. However such efficiencies are often hard to demonstrate objectively and are in any case often not evaluated quantitatively in an acceptable scientific sense, after the event. It can often be shown in fact that other management objectives such as attaining greater control over the production process are being served. Thus management are introducing new technology in order to increase their power base, by implication at the expense of other work groups. Technology therefore has social and political consequences and cannot be dealt with as if these did not exist. Wilkinson suggests that the context of technical change is often dealt with as being of no importance. If skilled workers are to have their jobs deskillled this is treated merely as a constraint to be overcome.

"The fact that managers may introduce technology

P.R. Gamble
Many of Wilkinson's observations point out the negative effects of the new technology; deskilling, labour displacement, more routine and boring work. However, his concerns are not entirely born out by a contemporaneous survey carried out by the Labour Research Department in 1982 (76). Based on returns from 163 firms (compared to Wilkinson's 27) this survey found that in 83% of cases new technology had not led to substantial deskilling. In 11% of cases workers were downgraded and in 27% there had been some deskilling. However, almost 33% of workers reported that new technology had brought increased responsibility and a further 33% felt that there had been no change. On the whole however, taking account of possible discrepancies between interaction and realisation, the varied results in the survey do bear out Wilkinson's key point that the effect of technology may be what management may choose it to be. Wilkinson draws on Mumford (77) to reinforce his point that work groups may be retrained or redeployed in many cases, if that is desired.

In mechanistic organisations like bureaucracies, much technological change can be opportunistic. This was observed in the catering case studies in chapter B. Warwick (78) refers to the American State Department's taking advantage of the Cuban missile crisis to obtain a more modern communication system for itself. In a similar vein to Wilkinson and Pettigrew he argues that,

"... a reorganization plan pegged only to considerations of rationality is doomed to failure. Even worse, it will often aggravate the very maladies it was designed to cure." (78)

4.1 Political and Social Consequences of Computers in Hotel and Catering Organisations

The introduction of computer based procedures in hotel and catering organisations touches on an area treated very little by the literature. Most existing studies focus on manufacturing and industrial work groups rather than on service industries, though early investigations of insurance companies and airlines have taken place. The deficiency is
unfortunate since both empirical evidence and prediction indicate that as a result of information technology, most change will be experienced by administrative and clerical groups heavily represented in service industries. For example, the Labour Research Department survey found that by contrast to manual workers where there was little job loss or deskilling as a result of new technology, in about one third of cases clerical jobs were displaced.

Such evidence neatly confirms the predictions of Barron and Curnow (79) made three years earlier. Noting the high costs and marginal additions that microelectronics would bring to manufacturing industry, Barron and Curnow described the technology of administrators and of offices as primitive. In such circumstances, they forecast that relatively low investments in office technology would lead to massive productivity gains. They also recognised that change of such magnitude would have a major impact on the content of some jobs.

The jobs most directly affected will be those of managers. Thus the services provided by hotel and catering organisations will hardly be affected by the installation of administrative computer systems for decision support. The situation is somewhat different from that of a management group who are seeking to use technology to restructure an organisation. It may be that managers in the hospitality industry see computers as a technology that may call for a reorganisation of itself. The position is somewhat akin to that of the senior bureaucrats in Warwick's study of an approach to the reorganisation of a major bureaucracy, the United States' State Department.

"... if change is to be made and, more important, if it is to endure, it must have strong roots within the agency [the State Department]." (80)

The impact of computer based administrative and decision support systems may have both social and political consequences within the choice of senior managers but they must initially seek to make that choice. The nature of the choice was outlined by Gamble in 1982 (81). Essentially it requires hospitality managers to align themselves more closely with the uses of information technology through systematic personal development. There is little evidence four years later that they have done so.
Following Salancik and Pfeffer (82), it may be argued that existing management information systems in hotel and catering organisations are an aspect of institutionalised power. The example of banqueting departments cited above is analogous to the credit manager cited by Salancik and Pfeffer. The credit manager resigned when his bank installed a computer system because it reduced one source of his power, the approval of credit applications. Power accruing to individuals or to coalitions is largely contextual. Scarcity, criticality and uncertainty are all conditions that increase power. In the hospitality industry there is a scarcity of skilled managers. It is in the nature of a service product that it is only produced at the point of consumption and therefore the style of its delivery is critical. The operating environment, encompassing a large potential problem space ranging from the price of commodities through to international relations and exchange rates is highly uncertain. It may therefore be suggested that hospitality managers are inhibited from applying information technology in a manner that will improve or systematise administrative procedures so as to institutionalise their power base.

"While in power, a dominant coalition has the ability to institute constitutions, rules, procedures, and information systems that limit the potential power of others while continuing their own." (83)

The rapid introduction of technological innovation in these circumstances, requiring the development of deep personal insights and a willingness to destroy styles of hotel administration with long rooted traditions, seems unlikely. To some extent, this can be seen as an example of the suboptimisation of organisation performance resulting from the effect of power in decision making. A radical shift in the operating environment or the application of an external 'force majeure' would appear to be required if anything beyond passive compliance to current business practice is to be expected.
Factors which may affect Technological Innovation by Managers in the Hotel and Catering Industry

From the arguments presented so far in this chapter it has been suggested that managers in the hospitality industry may not value computers as decision support tools for themselves. However, there may be environmental factors that will affect the nature of decisions that they make. Obvious examples might be cited of situations where individual units are caught up in decisions made at a higher level. Thus a large hotel company may impose computerisation on its operating units in order to cope with data volumes or to link to airline reservation services. A large catering operation may introduce computers to deal with data volumes or as a defence mechanism by managers caught up in organisational change. Situations of this sort are reported in chapters 7 and 8. As such they may be said to represent passive implementations of information technology that stimulate no further initiatives.

If evidence were needed that computers of themselves have little direct effect on organisation structure then this alone might be proof enough. However it is possible to support the position from the literature. The main investigations about the effects of computerisation on structure examine influences on centralisation or decentralisation.

Several of the studies which suggest that computers lead to increased centralisation examine the work of insurance companies. In the early 1960s insurance companies were examples of one of the few administrative organisations making heavy use of computers. Both Delahanty (84) and Whisler (85) reported that computers tended to push what Whisler calls choice-making (decisions) to a higher level in the organisation. Gallagher (86) reports on the centralising effect of a seat reservation system for American Airlines in 1961.

By contrast, Wagner (87) found that a gas utility company was able to keep its decentralisation policy intact when it introduced a computerised personnel system to cope with expansion and diversification. Stewart (88) writing in the early 1970s about British Petroleum found that a computerised investment planning model actually increased decentralisation. It gave regional co-ordinators decision powers...
previously unheld. Reif (89) is also able to describe the results obtained by a manufacturer of heavy industrial equipment which was able to maintain its policy of decentralisation after the introduction of a computer.

The need for caution when interpreting these studies in the present context must be acknowledged. It cannot be maintained that each researcher was using identical measures or definitions of centralisation or of control. In deference to Wilkinson it must also be noted that none of the studies were able to examine the effectiveness of the structure adopted or even the efficiency of the computer system for its chosen purpose. There are also problems of the perceptual bias of both the researchers and the managers. For example, Reif noted that it was clear that some companies might profess to retain a policy of decentralisation whilst quietly centralising many functions and decisions. These were not confronted by managers because they were defending themselves psychologically from what they felt was an unacceptable company policy.

The underlying issue in each of these cases has been highlighted effectively by Robey (90). The effect of computerisation on organisation structure can be interpreted consistently with the task environment of the organisations that were studied. Thus airlines and insurance companies operate in stable task environments and were in any case already highly centralised. By contrast, the organisations reported by Wagner, Stewart and Reif were either expanding rapidly or were multi-nationals for which a decentralised structure was most appropriate. The exception to this thesis is a study by Katzky (91) who found a positive relationship between decentralisation and the number of computers used in a study of 53 state employment agencies. Her findings are inconsistent with the apparently stable task environment in which such agencies function, though she only reports on one type of decision which the agencies had to make. It is also somewhat anomalous to use the number of computers as a variable.

Fifteen years ago in 1971, Stewart observed.

"Generalisations about the impact of the computer on management are likely to be misleading. The nature of the impact can vary because of differences in the type of problem that the
computer system is designed to help with, because of differences in the organisation of the computerisation process and because of differences in the extent and nature of managerial involvement." (92)

The statement is of course consistent with contingency theories of organisation structure and power. The question is then raised as to how managers in the hospitality industry perceive their environment.

5.1 Perceptions of the Environment by Hotel and Catering Managers

If managers in the hospitality industry perceive their environment as subject to change, they may be inclined to use computers not so much to improve their information systems but as a device for transforming the organisation. This would imply explicit recognition of social and political consequences of the technology and its deliberate manipulation so as to introduce change.

The weight of evidence suggests that in the commercial sector at least there is tremendous commitment to preserving the status quo. Very rarely do hotel or catering companies reformulate their product in response to environmental conditions. Instead there is a trend to develop a standard product until it saturates the home market and then support growth by exporting it. Those companies which have enjoyed the greatest expansion over the last two decades have all followed this model. European hotel companies such as Crest, Trusthouse Forte, Grand Metropolitan, Novotel, Accor and Club Mediterrane have each pursued this linear pattern of growth. In the United States, Hilton, Holiday Inn, Hyatt and Ramada reinforce the point. Restaurant companies, mainly in the fast food market have used the same technique so that MacDonald's, Kentucky Fried Chicken, Pizza Hut and Wimpy have all spread over the globe with the same basic offering. Faced with a downturn in business, these hospitality organisations do not reconstruct their product. They engage in cost cutting, manipulate prices and basically sit tight to await an upturn in the world economy. To this extent, according to Slattery and Olsen,

"The hospitality manager in this tradition is a siege manager with a product orientation who seeks to protect his organisation from environmental invasion. Organisational change, far from being a
All of the examples given are companies marketing a branded product. Organisational change associated with computer usage would do nothing to affect this platform and could even enhance it by promoting greater centralisation. In a stable environment, such centralisation would be tenable. Whatever the extant condition of the external environment, there is circumstantial evidence to show that the personal perceptions of managers in this industry take the form that environmental change is of little consequence for the underlying nature of a hotel or catering organisation. This is consistent with Hedberg's (94) contention that non-adaptive organisations tend to see their environment as static.

From the interviews reported in chapters 3, 7 and 8 it is noted that managers have almost no contact with technical specialists who would influence developments in information technology. Their main sources of keeping up to date are other managers in the same sort of job or trade magazines. As far as is known, not a single British hotel and catering company has a research and development programme associated with information technology. The opportunity for problem recognition is therefore reduced.

Such disregard for important sources of potential change is not confined to information technology. A study carried out by Olsen in 1981 (95) showed that of 58 chief financial officers of major American hospitality organisations, as many as 40% did not take risk into account when considering investment strategies. At a time of recession in the world economy, this demonstrates a fine disregard for the external environment.

To return to Child's (96) proposition that the relationship between an organisation and its environment can only be understood by the strategic choices which managers make, there is nothing to suggest that the environmental perceptions of managers will allow them to interface their organisation with the environment in an effective manner. In common with other activities that attract a high proportion of family businesses, there is a very high rate of bankruptcy in the hospitality industry. Hotel and catering organisations operate in complex and variable
environments. It can hardly be maintained that a hospital caterer in Brighton and a commercial caterer in Harrogate face uniform problems or even that the London Hilton and the Kuala Lumpur Hilton must deal with identical issues. It is rather that solutions to these local difficulties, whatever they might be, are not perceived in terms of information technology.

Contributory factors to a lack of innovation by managers may also reside in organisational size and in existing forms of structure. Noting the low levels of innovation produced by very large organisations, McIntyre (97) suggests that very large organisations foster resistance to change by their very nature. Being successful they are unwilling to tamper with the unknown. Being large, they can grow through acquisition. Being formalised they can acculturise their members. Being hierarchical they tend to reward existing ways of doing things, innovators run the risks of noticeable failures by not observing company practice. It is also characteristic for large companies to follow rather than lead the market since incremental change based on careful market research is easier to achieve within the organisation. Almost all the companies cited above have annual turnovers exceeding £1 billion, in one or two examples exceeding it quite comfortably.

This does not explain a lack of technological innovation in the many hotel and catering organisations which are very small. The absence of a lead by an influential company may be a factor in these cases but the major reason is probably attributable to internal hierarchy and departmentalisation. McIntyre argues that the politics of a hierarchical organisation may decrease the effectiveness of attempts to innovate. Thus a product champion unable to marshal sufficient power to impose an innovation is left in the position of persuading a number of diverse departments, each with different interests, of its efficacy. Shamir (98) when commenting on the differentiation observable in hotels, remarked that even medium sized units may have as many as ten different departments and that a single department like a kitchen, might have as many as 23 job titles and as many as 10 hierarchical levels.
The increased application of computer based procedures to support decision making in hotel and catering organisations would be both strategic and innovative. Strategic because the decision would have important consequences. Innovative because it would represent the application of a technology in a new way. Much of the existing research that considers the effect of material technology is set in the context of manufacturing industry, though one or two early studies on the effects of computers have looked at banks, airlines and insurance companies.

The literature pertaining to the adoption of computers offers no consistent thrust. There is no constancy of definition or terminology between studies and a lack of distinction between the effects of decisions to adopt computers for managers and the effects of decisions to adopt computers by managers. It is therefore difficult to distinguish from the existing literature, differences that might be expected between situations affecting decisions about computers, from those related to computers in decision making. However, there are no findings to support the notion that computers have consequences for organisations outside the context of the environment in which they were utilised.

All the computer technology studies were undertaken at a time when the installation of a computer represented a substantial investment. The advent of the inexpensive microcomputer has certainly rendered the financial context of an innovative decision different. There has been no attempt in this chapter to consider the economics of information. This is quite deliberate. The issue is considered to be irrelevant, particularly in terms of current system costs. Like a researcher selectively seeking to represent a particular case, managers can and will rationalise the purchase of computerised systems if they are of personal value. In any event, management accounting systems in hotels or in catering organisations do not lend themselves to quantifying or evaluating the cost of information. Low levels of implementation can hardly be attributed either to labour unions. The level of union membership in hotels and restaurants is low. However, there may be factors inherent within the systems themselves that inhibit innovation.
In a paper examining the human aspects of information technology, Eason (99) criticises the poor design of many computerised systems. He points out that many people, including managers, often have little technical knowledge of computers, have a limited perception of the machines' capabilities, are usually task centred and wish to minimise the effort needed to operate the computer system and, most important of all, have the discretion not to use it. In changeable task environments, such as those faced by hospitality managers, there is great difficulty in designing computer systems that will remain relevant. However, there are also many contextual issues including those of power, formalisation, job content change and even personal advancement that may inhibit innovation.

This chapter has sought to examine reasons that may exist within the managers themselves as to why they do not value a greater role for information technology, particularly computers, for decision making. Within the decision making process it is apparent that managers are inclined to use a great deal of soft data and that speed, increased data volumes, alternative forms of representation and other perceived benefits of computers are not relevant to the ways in which they like to make choices. Writing in one of America's leading hospitality magazines, Kiechel (100) ascribes the ambiguous, unstructured character of many management decisions as a major factor in limiting the interest of hotel and catering managers to computerised decision support systems.

Whether they are considered formally or not, it is self evident that many information generating procedures do exist in a hotel or a restaurant. Some are imposed by the law, which sets out requirements for books of account or records of employment. Others are imposed by the need to support transactions between one department and another or between the hotel and external organisations. There even exist complex, information based models about the way in which markets or customers may behave. The experienced reservations manager knows whether to risk blocking off a set of rooms or whether to refuse an enquiry. Decision models may not be written down but they exist nonetheless. Such data could be channelled through an information system which will support decision making, though it must be acknowledged that existing computer programs are not very capable of dealing with ambiguous data. Research in artificial intelligence has tended to concentrate on scientific and engineering
problems in which conflicts between experts can be resolved.

The hospitality manager's role is central. The way in which an information system is designed and the way in which it is integrated into the organisation of which it is a part, will determine the kind of effects that will be experienced. If the selection and design of the system is proposed by outside specialist advisers, then these criteria are unlikely to recognise the social and political issues which are important to hotels and restaurants as organisations. The expertise of the hotel manager in this connection could lie in being able to apply the technology to the resources which are available, within the context of the social environment in which a hotel exists. Information technology will not be exploited successfully by hotels, until hotel managers are prepared to become actively involved in the design of the information systems of which they form a part. The position has been summarised by Nailon.

"Hospitality management can . . be seen as the active co-ordination and balancing of the interrelationship of the four systems represented by the external environment, the human resources, the technical infrastructure and the management information system." (101)

If managers are not inclined to innovate for themselves, it may be that they would seek to use information technology as a political device to transform the structure of hospitality organisations. However, it has been suggested that this is unlikely for two reasons. Firstly, it may appear that in a service industry where the product is manufactured at the point of consumption, disorganised, uncertain and fragile systems institutionalise the existing power base. This value system is reinforced and preserved by mechanistic and hierarchical forms of organisation. Secondly, whatever the empirical nature of the external environment, the behaviour of hotel and catering organisations, as evidenced by the decisions that are made, suggests that hospitality managers choose to perceive it as stable.

The central issue to an increased rate of innovation would therefore appear to be a change in the value system of the managers themselves. To take another analogy from the computer world, the program that loads itself into a computer when it is switched on is known as a "bootstrap
loader". This small program has the sole task of loading other, larger programs that will enable the computer to begin work. The name is derived from the way in which the computer apparently picks itself up by its own bootstraps. Hence the expression, to "boot a computer" when referring to starting it up. To bootstrap technological innovation in hotel and catering industry will require changes in managers' perceptions of either computers or the environment in which they may be used, and the development of insights which will enable managers to relate computers to the way in which they make decisions.

Very little research has been conducted to examine the link between ideologies, values and decision making and this is an area that warrants further study. This research intends to contribute a discrete examination of the political processes that influence innovation adoption decisions by hospitality managers. Existing texts are prone to attribute many ill-defined, background effects to the political process so that the politics of introducing information technology might be confused with the effect of that technology on organisational politics. Attempts to depoliticise the impact of this technology serve to confuse the issue even more. The research methods adopted by this study are chosen so as to differentiate these effects more clearly.
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CHAPTER 5

The Usage of Information Technology in Hospitality and Food Management

1 General Trends in the Application and Use of Computers

1.1 Computers and Information Technology

In the thirty years or so since computers were developed commercially, they have come to be a major factor in western societies. Even in 1979, Barron and Curnow (1) argued that the extent to which society depends on computers is enormous. They pointed out that if for some reason, all the computers in the West ceased to function, the results would be catastrophic. There would be a complete loss of military security. There would be a breakdown of internal security due to the failure of much of the telecommunications network, internal transport systems and the disruption of police control systems. Electric power generation could not be maintained and many continuous process industries would be completely crippled. In the commercial world the banking system would collapse and many large companies would be unable to regulate their own activities.

Despite such an apparently central role, computers have made relatively few incursions into the world of hotels and restaurants. One of the reasons for this has been the very high cost of computing devices. Until recently, cost has restricted the application of these machines to situations where information has a very high value. Another reason has probably been the close association of computers with numerical processing. Most of the information that is processed in a hotel is not numerical but textual and it is the extension of computing techniques towards the more effective manipulation of text (words) that is raising the level of interest in office automation. Data can be collected by computers or by manual methods, it can be stored magnetically and it can be communicated electronically from device to device. At last a point of development has been reached where it is more convenient and cost effective to do these jobs by machine rather than by hand.

Advances in microelectronics are at the centre of all the technologies...
Computers and Innovation in the Hospitality Industry

involved. Over the coming decade, the exploitation of electronic information is expected to be a dominant factor in managerial innovation. At the moment, engineering, communications and computer science are treated as three separate subjects but increasingly the links between them are becoming closer. Electronic computers are not fundamental to information technology as such but they do represent a very convenient device for representing information.

The advent of small, powerful, low cost computers is of great importance to the hospitality industry. Patterns of ownership of hotels and restaurants, indicated in chapter 1, show that the industry comprises many small businesses, often without the means to spend vast amounts on information systems to help them make more effective decisions. Even the larger hotel companies have not found the resources to develop sophisticated systems based on large, expensive computers, so as to exploit this technology to the full. The small computer means that virtually any size of organisation or indeed any department within an organisation can obtain direct access to information technology.

1.2 The Impact of Small Computers

It seems that many writers on business computers have found it necessary to recount the trends associated with falling hardware costs and improvements in computing performance. For example, Evans (2) catalogues falls in cost, Hugo and Knight (3) deal with the evolution of systems and Keen (4) describes implications for the management and development of systems. The implication of these trends is summarised below.

1.2.1 Centralised Computing

The first generation of commercial computers were big, expensive machines. Typically they might have cost in the order of £1,000,000, of which the internal logic accounted for about 60%. Since these machines were physically large, they occupied a lot of space in a controlled environment. The amount of dust in the air had to be restricted and extremes of temperature had to be avoided by means of air conditioning. They were also very complicated devices to control and program, so that highly trained technicians were needed. Thus both the capital and the
operating costs of computers were very high. Only large organisations could afford them. Once purchased, it was in the interests of the company to utilise this investment as intensively as possible. The best result would involve very little time out of service for maintenance.

The most efficient way to utilise a computer for 23 hours and 55 minutes of every day is to organise the work of the computer in batches. Batch computing means that the work of the computer is tightly scheduled. A very large number of departments use the machine and their jobs are run in turn one after the other. As one is being completed another is being set up. There is no break or pause. If the organisation which bought the machine cannot use it all the time, the excess capacity can be sold to other companies. This is a very efficient way to use a machine and leads to very high levels of utilisation.

Unfortunately, it is not a very convenient way to provide computer power to managers. If the machine is located in some remote, central location then work has to be transported to the computer. Due to the tight schedule under which the computer is being operated, the work also has to go on time. Thus the activities of an operating department have to be regulated according to this schedule, thus the operating department is subject to external influence. It is also necessary to introduce a set of controls to make sure that everything that set off for the machine, was actually processed by it. If 1,000 payroll records were sent from a department, it is important that 1,000 get processed. Were only 999 to go through, some method must be available for identifying which one was missed.

In addition to the extra work of the control procedure, there is the special task of preparing jobs for the machine. Since the computer has to be used intensively, time cannot be wasted slowly entering data. All the data preparation must be done in advance so that the computer can read it as quickly as possible. In the early days data preparation often took place on punch cards. Quite a lot of extra work is involved here too since all the data have to be copied from coding sheets and checked.

The scheduling of jobs on a centralised computer is based on some system of priorities. The more important jobs are run promptly, the less
important have to wait their turn. The speed with which reports are returned from the computer depended partly on the speed of the collection and delivery service and partly on the priority of the job. It would not be unusual to wait 24 or 48 hours for the processed data to be returned. Even then it can contain mistakes due to operator errors in processing the data. Since operators have no direct knowledge of each job, outputs cannot be checked and are returned to originators regardless of content. If the outputs contain errors, the data have to be corrected and another 48 hour delay endured until the job can be rerun. Due to the slow turnaround time users tend to tell the computer to produce very comprehensive reports. It is much easier to ask for 300 or 400 pages of printout, most of which will be unread, than to initiate new reports if some special analysis is required.

Finally, the operation of the computer department itself is in the hands of a specialist group. The group has its own political and personal needs which do not always coincide with the needs of users. To get promotion and to provide a career path, the computer department is interested in more, bigger machines which implies bigger budgets and more staff. It introduces its own procedures to suit its own convenience and it reinforces its status by making things appear to be as complicated as it can. At each opportunity it emphasises the technical nature of its operations and forces users to conform to the technology of the machine, rather than developing procedures that are easy and straightforward.

Computers need no longer be big, expensive or technically difficult to use. They need no longer be remote devices able to produce only voluminous, largely irrelevant reports after a long interval of time. They do not have to be in the hands of a specialist department with its own separate identity and needs. Unfortunately, this perception of computers has lingered in the minds of many managers.

1.22 Decentralised computers - timesharing

The invention of the transistor and the consequent introduction of minicomputers made a big improvement in bringing computer power to the user. A minicomputer was smaller and cheaper than the large computers of the previous generation. A large organisation could now afford to buy
more of them and to locate them at least in every building. Several users can be connected to the machine simultaneously so that they can have direct access to information. An arrangement by which several people share the simultaneous use of the same computer is known as timesharing.

A timeshared computer is a lot better than a computer used on a batch basis from a management point of view. Many of the long delays associated with the batch turn around are eliminated, reports can be obtained more easily and data preparation is simplified, as data can often be entered directly into the machine. On the other hand it is by no means an ideal way to obtain computer power.

It is still very expensive. The cost of the machine may have fallen by one order of magnitude to say, £100,000 but that a high cost in relation to the modal turnover of a hotel or catering organisation. At the same time it still costs a lot to run. When a computer is servicing a number of users it has to check each work station, one after the other, to see if that user has anything for it to do. If something is to be done, the computer has to locate the place in which it left that user’s job, fetch it into main memory, figure out what the user wants to do now, execute some or all of the commands it has been given and then refile the job until it polls that terminal again. All these actions have to be done in a timeslice, a time allocation, of probably less than a second. The program which allows the computer to do all this, known as the timesharing monitor, is very complicated indeed. The computer also has to do a lot of housekeeping so that it does not muddle up different jobs and different sets of data.

The net effect is that a timeshared computer is not very efficient. It can be spending between 40% and 50% of its time on its own housekeeping operations. It has been likened to buying an expensive motor car yet letting the motor manufacturer’s company drive it on Mondays through Wednesdays. As the computer gets busier, it will get slower. The efficiency of the computer under load depends to some extent on the design of the paging algorithm. The paging algorithm is the set of instructions which the computer is following to save each person’s work and fetch it back again as it is required. Rather like flicking to different pages of a book if it were being read by several people at once. As the volume of
work increases, the computer's performance will degrade in a way that is very hard to predict scientifically. The exact effect depends on the mix of jobs.

A timeshared computer is therefore a much more complicated device than a batch computer. It uses complicated instructions, it needs a complicated (and expensive) system of communications to link it with all its users. It needs extra levels of security, sets of passwords and protected levels of access, to prevent unauthorised access to confidential files. On top of all that, the response time is irregular. As the machine gets busier it also gets slower. A user can never be quite sure whether the machine has slowed down because the wrong keys have been pressed, or because the computer cannot do what it has been told to do or simply because it is doing more work. In a hotel, this could be very inconvenient. It must also be noted that a failure of the central device leads to a loss of service to many users.

Some of the larger hotel systems are still based on timeshared minicomputers, supported by one or two specialist staff or operated under some form of contract by a computer company. The potential dangers of losing the computing service to the entire hotel are usually offset by using two machines which are linked in some way. Until recently it was necessary to use larger computers where big record systems, needed for things like guest history and accounting, were required. Integration between different kinds of procedure is easier to maintain in a shared system of this type. Thus the reservations, registration, billing and accounting procedures can all obtain access to the same files of data, on the one machine.

1.23 Distributed computing

As early as 1977, almost from the commercial inception of microprocessor as a device within small computers, major changes were forecast in the application of computing devices (5). By and large many of the technical, if not the social, consequences were borne out. Thus in 1984, Lewis (6) was one of many authors who have described the management applications of small computers. The invention of the microprocessor has radically altered the accessibility of computing power. The price of computing
devices has fallen rapidly in real terms over the last decade. A computer can now be placed conveniently on the manager’s desk. He or she can use it whenever needed and it can be dedicated to tasks which will make the manager more directly productive. The running costs are at such a level that it is not even worth turning the computer off to save a fraction of a penny in electricity. Modern computing devices have no environmental requirements beyond those of a normal office. Microcomputers are so cheap to buy that it is easier to purchase extra machines for different jobs than to commission complicated timesharing programs. This also has the desirable side effect of increasing system redundancy. If one machine fails, it can be substituted immediately.

All the users are now independent and the performance of one machine is not affected by any other. The control program to run the computer is therefore much simpler and although it may not be quite as fast as a minicomputer, at least its response time is predictable. It will always take the same amount of time to do the same job. In any case, for all practical purposes, a microcomputer is fast enough for most hotel work. Only a small proportion of hotels are big enough to warrant the purchase of more powerful machines.

Today, many of the disadvantages of early microcomputers have been overcome. The limitations on their filing capabilities have been removed through the invention of small, high capacity, winchester type disks. The difficulties of linking several machines together so as to provide a number of people with access to the same files, needed in areas like reservations and reception, can be addressed by using networks. Thus a big file can be maintained centrally by one small computer called a file server. Independent work stations can then link into this file as required, to obtain data. Information technology based on microcomputers allows a manager great flexibility and provides the freedom to make jobs more interesting and productive.

It is important to recognise the difference that these changes have wrought on the problem class of introducing computers into organisations. Small computers do not require large technical support staffs. Politically, they do not make major claims against the resource base of the organisation in the same way as a mainframe or minicomputer. The
purchase price can be low enough to be insignificant for most organisations and certainly for the hotels and catering institutions in this study. Physically they are small enough to locate directly on the manager's desk and it can be argued that unless the manager interacts directly with this tool many of its potential benefits will be lost. Many of the advantages of a spreadsheet package cannot be derived second-hand via a secretary or a clerk, in the same way that something is lost if the family car is used as if it were a bus, driven at the behest of a third party. Thus the conditions of purchase and usage are different to those affecting many of the earlier computer impact studies, several of which were cited in chapter 4.

2 The changing role of computers and information systems in hotels

Almost everyone has a sense of the changes that have taken place in the cost and availability of computers over the last two decades. Writers such as Evans (7) have discussed some of the changes associated with the advent of small computers. Forester (8) has written and compiled papers on both technical and social effects of microelectronics and others such as Laver (9) have considered associated social consequences in some detail. Many of the more profound ideas about the information society have been elucidated by Bell (10) who coined the term 'postindustrial' to describe it.

It is therefore interesting to speculate about the way in which computers might make an impact on the operation of a hotel or restaurant. It is also useful to consider how the role of computers and the design of information systems might change, in response to the trend away from expensive, centrally operated machines to the provision of local, directly accessible, computing power, based on a number of inexpensive computers. Some of the potential consequences for the hospitality industry are discussed in a book published by Hutchinson, entitled Small Computers and Hospitality Management (11).

2.1 The clerical hotel computer

When computers are first introduced into a business, they are often relegated to doing the kind of jobs that clerks do. The only differences
being that they work at electronic speeds. This is very typical of the way that computers are first used in hotels. They are mainly introduced in back of house areas to perform tasks like payroll processing or accounting. Sometimes they are used in front of house areas like reservations. The design and function of the systems into which they are incorporated, however, remains substantially unchanged. If the value of the computer is assessed at all, it is often measured in terms of labour displacement; the investment being justified by the number of jobs that can be removed. The people most at risk from such an approach are clerks, particularly cashiers and accounts clerks. Fortunately the threat potential of using computers in this way is defused by the fact that the machine is used largely to prop up a creaking manual procedure, which cannot cope with existing volumes of work. The pattern of use is illustrated in figure 17.

Notice that the word control in figure 17 has been enclosed in quotation marks. At this level of application, managers often talk about improvements in control because records are organised more reliably and neatly. In practice, while they are better able to understand historical events, the computer does not in fact provide for more control over either present or future events. This weakness was particularly pertinent in this research to the concept of the catering information system described in chapter 8.
FIGURE 17

The Role and Justification of the Clerical Hotel Computer

Application

Evaluation

- Stock control
- Reservation records
- Accounting (ledgers)
- Payroll

Clerical functions

- Labour Displacement
- Better "Control"
2.2 The administrative hotel computer

Using a computer as an electronic clerk is not very imaginative. Nor does it really improve productivity in the hotel by very much. Productivity can only be improved if the ratio between resource inputs and outputs is changed. For example, if more information is available for the same level of costs or, better still, for a lower cost. A clerical computer does not generally achieve such a result. For a greater investment, a similar amount of information is produced, albeit more quickly and neatly.

On considering the differences between the way in which a computer works and the way in which a person works, it may be realised that computer based procedures can and should be different to manual procedures. Since a computer will not get tired or bored and since it will maintain large sets of records without complaint, then it becomes possible to solve one of a hotel's main problems. That problem is the sheer volume of data which is available. A modern small computer, able to run a big filing system, could allow the hotel to undertake procedures which are either very expensive or even impossible to provide manually.

A guest history system supplies a good example. Traditionally large, luxury hotels in big cities have kept records of their guests. Usually such records have needed the services of two or three people to maintain them. As guests depart they will bring record cards up to date. Before guests arrive, they will extract cards from the files and enter pertinent details of previous visits and personal preferences on each day's arrival list. Smaller hotels, which would have liked to offer this service, have shrunk from the difficulty and expense. The use of a small computer for guest histories, not only makes it possible for a much wider range of hotels to support them but brings other benefits as well. The guest history can also be analysed by the computer to produce valuable market information. The illustration in figure 18, provides examples of procedures which might be changed by using a computer.

The administrative computer can change the very way in which hotels operate. Time consuming tasks such as food and beverage control can be undertaken cheaply and efficiently by machine. The computer not only records movements of cash through the business but allows management of
cash flows. Procedures which depend on keeping good records like maintenance planning, guest record or personnel administration can be transformed. Primitive bin card systems in store rooms can be displaced if a computer is used to manage the level of stocks according to business demand. Even the quality of correspondence may be improved by personalised, computer printed, letters. Measurement of computer performance by means of cost displacement is no longer useful at this level. Evaluative criteria are framed more validly in terms of better personal relationships. With staff due to the removal of boring, repetitive jobs and with customers through better service. The financial position of the hotel should be improved with better funds flow management, increased revenues and smaller amounts of capital tied up in unproductive ways.
FIGURE 18
The Role and Justification of the Administrative Hotel Computer

Application
- Reservations
- Automatic guest history
- Word processing
- True food and beverage control

Evaluation
- Better customer service
- Lower labour turnover
- Lower working capital
- Better materials management
- Increased revenue

Administrative functions
- Accounting
- Cash flow control
- Planned maintenance
- Dynamic inventory control
- Increased revenue
2.3 The tactical hotel computer

By the early 1990s the emergence of networks of small computers in hotel and catering organisations might be expected. One or more computer workstations will be available to each department of the hotel, providing middle managers with a tool to assess the nature of decisions as they are encountered. At this point the computer will have moved beyond the stage of simply facilitating the ordinary business functions of the hotel. It will be using some data which is external to the hotel to influence tactical decisions, as in figure 19. At this point, certain functions such as purchasing and stock control will have become completely automatic. Since most hotel businesses will be using powerful, small computers by now, competition based on the possession of differential information will become less important. There will be few effective barriers to obtaining and maintaining sets of data pertinent to the business. As a result competitive advantage will be obtained by using information more effectively. Corporate success may begin to depend on the design and application of the hotel’s computer based information systems. Indeed, Porter and Millar (12) reported on observing changes in competitive advantage as a result of information technology in several manufacturing, retail and extractive industries by mid 1985.
FIGURE 19
The Role of the Tactical Hotel Computer

Consumer Information from government or commercial database

Commodity market conditions

Accommodation management

Materials management

Food production management and scheduling

Determination of the marketing mix

Middle Management Information

Financial management

Personnel and Industrial relations

Bidding strategy for banqueting

Application

Link from tour operator/travel agent's system

Money market conditions

Unk from tour operator/travel agent's system
By the early 1990s, it is less likely that managers will be required to justify the application of the computer from the rather defensive position that has to be adopted today. Some present issues will assume less importance in the same way that the debate over the appropriateness of hand written or typed letters has declined. The key issue will remain that of management value systems. Whilst computer installations will still be rationalised in terms of the best machine for the job it is possible that evaluations of performance will begin to shift to the information systems of which they form a part. Corporate success may be more determined by how successfully the hotel or restaurant is able to deploy computers in all areas of business activity. The basis of management skills will need to have changed if this is to be accomplished successfully. Managers will need to know which data to use for problem solving and which techniques to apply to those data sets. The availability of cheap, powerful machines will have removed any constraints which may previously have limited what is possible due to the complexity of processing or the volume of data. Figure 20 shows that the central issue to the performance of the computer based information system at this stage, could be its value to middle managers for tactical planning.
FIGURE 20

Justification of the Tactical Hotel Computer

- Improved realism in forecasting
- Optimum use of fixed and operating equipment
- Better rates of return especially on short run investments
- Improved negotiating position with suppliers

Optimum Marketing mix for rooms, food and beverage

Improved negotiating position for tours, conferences, banqueting

More effective direct selling

Improved sales planning and control. Optimum selection of sales and advertising budgets

Tactical Planning

Evaluation
2.4 The strategic hotel computer

At the beginning of this section the term speculative was used. A tendency for many futurologists is to over estimate the rate at which innovation will take place. However, it is reasonable to suggest that as computers are used to design new computers and as the technology diffuses through society, the turn of the century might well see the emergence of a totally new kind of business structure. This will affect hotels as it will affect other types of commercial and non-commercial organisation.

At this point, the functioning of the information system will be the primary concern of the business. In effect, all organisations will centre on their information processing systems and these systems will use data both internal and external to the organisation. All levels of management will be involved in this system and will depend on it as the basis of most decision making. The direction which the hotel will take, in a competitive sense, will be selected on the basis of the output from the information system. Thus the markets for which it chooses to compete, the kind of products that it offers and the way in which goods and services are provided will all change according to the interpretation of the environment that is currently accepted. Flexibility to this extent will only be possible by the application of many automated functions, most of which will be supported by computers.

Such computer systems will be directly involved in strategic decision making. The differences between the strategic and tactical levels will be noticed in many ways. Firstly, there will be a great extension in the use of external data sources. An outer circle of activities might be added in figure 19, to describe the network of information processing facilities that will underpin society and business as a whole. Secondly, there will be much more integration between these and between the information services of the hotel itself. Finally, most of these procedures will be completely automatic, using many self regulating control functions. It would be very difficult to draw a diagram of this situation since there will be links between every element of the system. The system might best be illustrated by example.

Take for instance, a hotel negotiating with a tour operator to sell blocks
Computers and Innovation in the Hospitality Industry

Chapter 5

of room/night. The hotel management team would be able to draw not only on the hotel's own data, so as to consider the marketing position in relation to their intentions and those of their competitors but would also be able to consider a wide range of external data. Factors such as exchange rates, commodity supply conditions, the likely attitude of labour unions, proposed government legislation affecting disposable income, probable fare structures on transport systems and even the predisposition of consumers to use hotels, could all be assessed by the computer based information system.

The sheer scope of possibilities is difficult to encompass. The computer will be used to identify markets, plan products, schedule capital requirements, recommend manpower needs, allocate resources optimally to different business activities and suggest what kind of production processes should be used in the highly automated kitchens. Whether the organisation survives or ceases will all depend on this information processing activity. Since the system is controlling what the organisation does, as well as how it does it, evaluations will probably have to take place in social as well as economic terms.

3 Using Computers in Hotels and Restaurants

It is normal in the hospitality business to refer to the users of a hotel or restaurant not as customers or clients but as guests. The implication being that the manager of the hotel is the host and the staff of the hotel are his or her helpers in providing as comfortable and as relaxed a stay as possible. The guest is an important person and it is everyone's job to make sure that the visit is an enjoyable one.

In the long tradition of the hospitality industry, social and economic conditions allowed for the provision of services by plentiful, low cost, personal labour. Thus, as the coach pulled up by the front door the doorman and the porter would be there to welcome the guest and to take the luggage. The guest would be escorted to the reception desk where he would be greeted by name. Since jobs were not easy to find, staff would remain with the hotel for many years, getting to know visitors who stayed regularly. The guest would be escorted to the room where a maid and a valet would help with the unpacking. There would be no private bathroom.
adjoining the bedroom for the simple reason that were a bath needed it would be carried into the bedroom itself. Someone would always be available within earshot of a bell pull to light the fire, wind the clock, top up the decanters, take dictation for a letter or rush out to buy some theatre tickets. A large kitchen brigade with many cooks and commis would prepare elaborate and time consuming dishes. The food would be served by attentive waiters. At the end of the stay, a carefully prepared, hand-written bill would be presented detailing in full all the charges that had been incurred. This would be signed and the guest would leave the building in the same splendid style.

In the 1980's we still use the term guest and most hotels still have the same intentions to provide for a hospitable visit but conditions are not the same as they were. The large, cheap labour force has vanished. Changing social conditions have altered attitudes to personal service making it difficult to recruit people for some kinds of service industries even where other kinds of work are not available. The business traveller from both the domestic and the international market now forms a substantial proportion of hotel users, especially in the upper-middle and luxury market segments, and these travellers need access to the communications and business services essential to their trade. The hotels are larger, the staff more transient, the technology more complex and expensive than it used to be.

The need for low cost, personalised service remains yet hospitality managers have not yet confronted the problem of providing it. The conceptual framework which they use to construe hotel and catering services appears to relate closely to historical models. Gershuny (13) has argued that the nature of postindustrial society as posited by Bell (14) may very well be demanding of more personal services but that technology will allow people to meet their own personal needs. This will produce not so much a service economy but a self service economy. An investigation by Nightingale (15) on the quality of service in hotels bears out some of Gershuny’s propositions. For example, guests in first class hotels, normally offered personal room service by a waiter, reported no perceived reduction in the quality of service when provided with the technology (in-room vending machines) to make their own meals and drinks. Schumacher (16) draws a distinction between technology which enhances
man's skill and power and technology which leaves man in the position of having to serve the slave. To compete with a slave is to become a slave. In his advocacy of "Buddhist economics" he argues strongly for the need for a social balance between work and leisure which are of equal importance.

"To organise work in such a way that it becomes boring, stultifying or nerve-racking for the worker would be little short of criminal; it would indicate a greater concern with goods than with people, an evil lack of compassion."

(17)

At the operational level, hospitality managers have exploited few opportunities to provide personal services through technology. In terms of decision making it may be that constructs which are applied in one area are being inappropriately extended to others. However, it is clear from the discussion in earlier chapters that considerable thought will have to be given to formalising decision making procedures before improvements are likely to be possible in hotel information systems.

3.1 Introducing computer based services

The hotel industry is not noted for its generous wages or its excellent conditions of employment. In one study (18), half of the people interviewed with experience in the hotel industry made reference to the long and difficult hours and a substantial proportion thought that many jobs were dirty and badly paid. They also thought that the jobs involved dealing with awkward, rude customers. Labour turnover, which would in any case be high in a seasonal industry of this sort, is increased even further by poor conditions so that employers are presented continuously with problems of recruitment and training.

In a cultural environment where some kinds of service jobs are perceived as unattractive and where people may refuse certain types of work without fear of destitution, then the problem of providing labour intensive personal service is made more acute. It is apparent that even if some service jobs can be filled, they are often taken by a semi or unskilled labour force with little commitment to their employer. Many such jobs are undertaken on a part time basis and sometimes for reasons in which the
work itself is of secondary importance. Increasingly, managers need to consider other ways of providing consistent and reliable hotel services.

The range of tasks which it is possible to support by means of a computer assisted or a computer controlled service is growing all the time. Ideally, the use of computers in a hotel should be considered at the design stage of the project. If this happens, a number of advantages can be gained.

a) The physical design can take the nature of the computer based services into account when layouts are planned. Thus the size and shape of the space provided in each work area will relate more precisely to the way in which the work is to be performed, proper provision for cable trunking may be made and compatibility can be used as an important criterion in the equipment selection process.

b) Computer based procedures are not identical to their manual equivalents. The flow of work may change, the kind of tasks that have to be carried out may alter, the way in which decisions are taken may vary and the number of people needed may differ. More important still, the interaction between people in the work place may alter. If the computer system is conceived as part of operating procedures of the hotel then it is more likely that these differences will be taken into account.

c) Manpower planning can take alterations in job design into account when personnel specifications are developed. The type and nature of information that will be available to managers may call for specific abilities and qualifications.

d) Sensible provision can be made in FF&E (Furniture, Fittings and Equipment) budgets for computer related facilities and operating requirements.

Such conditions do not evolve. They require a conscious and deliberate movement away from conventional procedures to a new style of work. This setting aside of old procedures represents the rejection of existing dogma.
3.2 Characteristics of hotels that affect computer use

Reliable information about the size and structure of the hotel industry is very difficult to obtain. Different government departments and different tourist organisations tend to use their own definitions and terminology. The data in table 9 relating to 1974 do not correspond with those given earlier in table 4 of chapter 1, relating to 1984. However, they do confirm the character of supply conditions.

The first characteristic that must be recognised is that the "average" hotel is a small business and in the UK at least, is unlikely to be allowed to sell alcoholic beverages (unlicensed). It is worth noting that over half of these hotels (55%) are located in seaside resorts and that most hotels are in private ownership. It will be recalled from chapter 1 that there is little concentration of ownership, with less than 30% of supply being provided by the largest 28 companies. In general, the pattern of size and ownership of hotel stock is roughly related to its age. In countries with many old hotels, mainly inns, guest houses and hostelries, the hotels tend to be small and privately owned and this is true of most northern European countries like France, Germany, Holland, Belgium and the UK. In countries where much of the hotel stock has been built to meet the needs of the post World War package tour market such as Spain, Tunisia and to some extent Yugoslavia the hotels tend to be newer and on average much larger.
**TABLE 9**

Structure of the UK Hotel Industry

<table>
<thead>
<tr>
<th>Size of Hotel (Bedrooms)</th>
<th>Number of Hotels</th>
<th>Percentage Unlicensed</th>
<th>Average (mean) Number of Rooms</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 - 25</td>
<td>30,355</td>
<td>90.2</td>
<td>64.7</td>
</tr>
<tr>
<td>26 - 50</td>
<td>2,040</td>
<td>6.1</td>
<td>13.6</td>
</tr>
<tr>
<td>51 - 100</td>
<td>880</td>
<td>2.6</td>
<td>5.0</td>
</tr>
<tr>
<td>100 +</td>
<td>384</td>
<td>1.1</td>
<td>4.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>35,659</strong></td>
<td><strong>100.0</strong></td>
<td><strong>59.3</strong></td>
</tr>
</tbody>
</table>

Source: Hotels & Catering Economic Development Council (1974)
The second interesting characteristic of hotels is the way in which they make and spend their money. Table 10 describes the revenue and cost structure of large London hotels in 1984. These data were chosen as representative of the case study subjects in chapter 7. In 1984, 34.1% of revenue remained after expenses were met which was available to pay taxes, meet capital charges and to distribute as profits. Although averages have a way of hiding variations in performance, the overwhelming importance of room sales to hotels emerges clearly. When the low marginal cost (the direct cost of consumables) of accommodation sales is also considered, then the link between room sales and profitability is emphasised even further. The Horwath and Horwath survey suggests that the departmental income from rooms (that is, the revenue which remains after deduction of direct operating costs) is about 74% while that of food and beverage is only about 20%. It is also worth noting the high proportion of their revenues that hotels spend on payroll.
### TABLE 10

Percentage Distribution of Revenue and Expenses for London Hotels 1984

<table>
<thead>
<tr>
<th>Sources of Revenue</th>
<th>Distribution of Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room sales</td>
<td>59.7</td>
</tr>
<tr>
<td>Food sales</td>
<td>21.9</td>
</tr>
<tr>
<td>Beverage sales</td>
<td>9.7</td>
</tr>
<tr>
<td>Minor operated departments</td>
<td>6.8</td>
</tr>
<tr>
<td>Rental and other income</td>
<td>1.9</td>
</tr>
<tr>
<td></td>
<td>Payroll related expenses</td>
</tr>
<tr>
<td></td>
<td>Departmental expenses</td>
</tr>
<tr>
<td></td>
<td>Food &amp; Beverage costs</td>
</tr>
<tr>
<td></td>
<td>Property charges and costs</td>
</tr>
<tr>
<td></td>
<td>Administration</td>
</tr>
<tr>
<td></td>
<td>Energy costs</td>
</tr>
<tr>
<td></td>
<td>Marketing</td>
</tr>
<tr>
<td></td>
<td>Gross Operating Profit</td>
</tr>
</tbody>
</table>

Source: United Kingdom Lodging Industry 1985
Horwath and Horwath International

Notes:
1. Number of hotels sampled = 54
2. Average number of rooms in hotels sampled = 335
The third aspect of the hotel and catering business that distinguishes it particularly from manufacturing and retail businesses is the way in which the goods and services it provides are manufactured and consumed. A hotel often carries a high proportion of fixed costs. That is to say that regardless of whether it is full or empty a large proportion of the costs which it has to meet still have to be paid, hence the need for high gross operating profits. Most of these costs relate to capital which was borrowed to pay for the construction or lease of the buildings and fixed plant but some costs are incurred for maintenance, heating and a part of the staffing costs (current labour laws do not make it easy to regulate payroll in accordance with the level of business). Inventories of sales, called reservations in hotels, are therefore especially important. In most businesses, if a customer places an order for a product they will probably accept delivery at some point and then pay for it. If they do not, then that product can be sold to somebody else. In a hotel the main item for sale, bedroom accommodation, is highly perishable in the sense that a lost sale can rarely be recovered and although it is sometimes possible to mitigate cancellations, some hotels find this especially difficult. This problem varies in intensity depending on the market which the hotel is seeking to attract.

A resort hotel will tend to accept reservations from the majority of its guests well in advance of their predicted arrival date. Most of these people will write to confirm their reservation and enclose a deposit so as to make sure of their holiday. Cancellations are fairly uncommon and usually occur due to changes in family circumstances. When they arrive, guests will stay for long, predictable periods such as one or two weeks. A hotel which builds up most of its trade from business travellers, located in a city centre or at an airport, is in a very different position. In this case, most reservations are made by telephone very close to the time of arrival. Perhaps as much as fifty or sixty percent of bookings might arise within seven to five days before arrival. There is not time for a written confirmation and no deposits are sent. Many of these reservations will not be taken up due to a change in business plans or because the executive has made simultaneous reservations at hotels in more than one town so as to allow himself or herself some flexibility. No formal notice of this cancellation will be given. This is known simply as a no-show. Guests who do arrive, stay for quite short periods such as
one or two days but are quite likely to vary their expected departure date one way or the other. It is therefore much more difficult for this kind of hotel to regulate its occupancy and subsequently difficult for it to regulate its revenue. Business hotels and city centre hotels tend to make far greater use of over booking in consequence, so as to be sure of filling as many rooms as possible.

A fourth characteristic is that most types of hotel also include credit facilities as part of their product and this too will affect their style of operation. Except for hotels in the very lowest market sectors, any guest checking into a hotel is usually extended credit implicitly for the duration of their stay. Although all hotels will try to regulate credit by fixing deposits and by managing credit limits, this often leads to difficulties. The status of the customer as "guest" implies a degree of trust that cannot be avoided. In addition, the number of transactions can be large, even though each amount may be quite small and spending may take place in a variety of operating departments. This alters the cash flow of a hotel since the direct costs of items such as payroll, food and beverage have to be met before revenue is forthcoming from the guest.

In summary, most hotels are small, independently owned businesses. They are trying to market a transient product in market conditions which are highly seasonal and difficult to predict. Their existing cost structure and the credit conditions with which they must operate make rapid returns on investment an important priority. Most profits are associated with sales of bedroom accommodation and it is not difficult for a resort hotel with long booking lead times and long average length of stays to devise manual procedures able to cope with these conditions.

Business hotels on the other hand often have great difficulty in regulating their occupancies. Their guests are also more likely to demand fast, efficient service and it is business hotels which were the first to install microcomputer based systems computers, primarily to address problems of accommodation management. Figures published by Hoskyns Systems, one of the first companies to market a microcomputer based front office system in the UK, clearly show in table 11 where early penetration of the hotel market occurred.


Computers and Innovation in the Hospitality Industry  

TABLE 11

Installations of Hoskyns Front Office Systems in London 1980

<table>
<thead>
<tr>
<th>No. of Bedrooms</th>
<th>Total no. of Hotels</th>
<th>Hoskyns Systems Installed or on order</th>
<th>Hotels owned by groups with intent to install</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 - 99</td>
<td>56</td>
<td>6</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>100 - 200</td>
<td>34</td>
<td>18</td>
<td>4</td>
<td>22</td>
</tr>
<tr>
<td>201 - 500</td>
<td>50</td>
<td>18</td>
<td>11</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
</tbody>
</table>

These figures were based on the classification of hotels used by the Automobile Association and show that at that time, only one year after the development of the Hoskyns system, over 40% of London's larger hotels (those in the AA book) either already had a microcomputer system or intended to install one.

A further analysis, this time including all types of computer system and not simply those based on microcomputers, suggests that early market penetration occurred mainly in middle market hotels and this is shown in table 12. Although some luxury hotels had installed computer systems to cope with the volume of business, it is possible that they still felt able to justify the high staffing levels needed to maintain high service standards and to charge the sort of high room rates necessary to pay them. Middle market hotels, forced to consider other approaches were turning to computers to maintain service levels. Three years later, the pattern of diffusion had shifted.
<table>
<thead>
<tr>
<th>AA Classification</th>
<th>Percentage which had computer systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Star</td>
<td>16</td>
</tr>
<tr>
<td>4 Star</td>
<td>37</td>
</tr>
<tr>
<td>3 Star</td>
<td>55</td>
</tr>
<tr>
<td>2 Star</td>
<td>23</td>
</tr>
</tbody>
</table>

Table 13 shows that penetration in the luxury hotel sector was complete and there appeared to be a correlation between hotel size and installation of computerised front office systems. During this period no evidence was published to suggest that staffing levels could be reduced or service standards improved through the application of computers to hotel front office work.

The application of computers to accommodation management made the greatest initial impact because of the evident importance of reservations management. By contrast, there was no evidence of any application of computer systems in food management areas of hotels. The work conducted for this research focused accordingly on institutional catering. The extent of computerisation in the hospitality industry spreads by a mixture of these two approaches.
**TABLE 13**

The Use of Computer Systems in UK Hotels by Size and Market Segment, 1983

<table>
<thead>
<tr>
<th>AA Classification</th>
<th>Percentage with Computer Systems</th>
<th>Number of Beds</th>
<th>Percentage with Computer Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 star</td>
<td>100</td>
<td>150 and over</td>
<td>62</td>
</tr>
<tr>
<td>4 star</td>
<td>57</td>
<td>100 - 149</td>
<td>35</td>
</tr>
<tr>
<td>3 star</td>
<td>26</td>
<td>50 - 99</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>less than 50</td>
<td>14</td>
</tr>
</tbody>
</table>

Source: The Caterer and Hotelkeeper (22)  
(from a survey commissioned with Gallup)
3.3 Integrated Hotel Systems

Such an apparent lack of integration between major systems is all the more surprising when the nature of hotel systems is considered. The same pieces of data are often used more than once. Sometimes the datum is used repeatedly by the same department, sometimes it is used on one or more occasions by several departments and sometimes it is transformed in some way so that it becomes a part of another report. Consider for example, the number of occasions on which a guest’s name is referenced and the uses to which it is put. Table 14 summarises some of these possible uses. Sometimes the name is used as might be expected, to identify a person, sometimes to act as the addressee of a communication or a datum such as a departmental charge and sometimes it is used simply as an index to other pieces of data, such as the marketing characteristics of the guest, when the guest history file is brought up to date.

In a computer system it is possible to take advantage of these constant references to the same sets of data by means of a technique called integrated data processing.

"In integrated data processing the attempt is made to record each piece of data once, to record it correctly, and then to utilize it in that same form in every possible way to elicit information for the planning and control purposes of the operation." (23)

This approach turns a necessary requirement to positive advantage. Each time that data are copied from one form to another, errors may creep in and this can lead to wasted effort and lost revenue. If such entries are only made once, the possibility of error is reduced, the more the process is simplified and the easier it is to handle the procedure by machine. Figure 21 illustrates some of the flows of data in a hotel. Although some of the exchanges of information have been missed out to make the drawing easier to follow, it is interesting to consider how a totally integrated hotel system might work in practice.
<table>
<thead>
<tr>
<th>Occasion</th>
<th>Purpose/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Reservation enquiry</td>
<td>Check status on guest history</td>
</tr>
<tr>
<td>2. Reservation confirmation</td>
<td>Address</td>
</tr>
<tr>
<td>3. Reservations chart</td>
<td>Cross index to correspondence file</td>
</tr>
<tr>
<td>4. Reservation amendment</td>
<td>Locate record on file</td>
</tr>
<tr>
<td>5. Arrivals list</td>
<td>Identification</td>
</tr>
<tr>
<td>6. Registration card</td>
<td>Legal requirement</td>
</tr>
<tr>
<td>7. Room status board</td>
<td>Identification</td>
</tr>
<tr>
<td>8. Enquiries board</td>
<td>Guest location</td>
</tr>
<tr>
<td>9. Telephonists board</td>
<td>Identification</td>
</tr>
<tr>
<td>10. Bill folio</td>
<td>Credit control</td>
</tr>
<tr>
<td>11. Each bill chit</td>
<td>Identification, cross reference to bill</td>
</tr>
<tr>
<td>12. Watch list</td>
<td>Credit control</td>
</tr>
<tr>
<td>13. Departures list</td>
<td>Identification</td>
</tr>
<tr>
<td>14. Forwarding address slip</td>
<td>Address for late mail</td>
</tr>
<tr>
<td>15. Guest history</td>
<td>Marketing analysis and sales promotion</td>
</tr>
<tr>
<td>16. Accounts receivable</td>
<td>Dunning (debt collection)</td>
</tr>
<tr>
<td>17. Mailing lists</td>
<td>Sales</td>
</tr>
</tbody>
</table>
Figure 21 demonstrates that all of the areas of a hotel and catering business are related to each other. A reservation can be linked to past guest history, then on to reception and room allocation through to billing, credit control and accounting. There is also a direct link between billing, other revenue areas such as food and beverage and the management of guest services for the duration of a visit. A computer system which controlled all of these, an integrated system, would be expensive to buy, install and maintain. Most hospitality organisations address these problems piecemeal. The London Tara Hotel for example, was by no means atypical in its approach of operating nine different computer systems in 1985. Even a technically orientated organisation able to call on its own computer support staff, would probably regard this as complex and inefficient.

The majority of hospitality businesses seem to deal primarily with stand alone computer systems that are designed to cope with a distinct subset of procedures. A summary list of these systems is given below. More detailed explanations have been provided by Gamble (24, 25) and by Kasavana (26, 27). The list illustrates the scope of the problem environment which the (non-technical) hospitality manager has to encompass and the extent to which overlapping technologies may be used to support alternative approaches.
FIGURE 21
Some Data Flows In an Integrated Hotel System

Chance arrivals

FORWARD RESERVATIONS

CURRENT ROOM STATUS

BILLING
Credit control

ACCOUNTS RECEIVABLE
Revenue control

ACCOUNTS PAYABLE
INVENTORY CONTROL
Purchasing

PERSONNEL SYSTEM
Personnel records
Wages and salaries

FINANCIAL ACCOUNTS
Reports
Taxation accounts

MANAGEMENT ACCOUNTS
Budgets
Variance reports
Profit plans

Sales projections

Statistics package

Market information system

External data

Market model

Financial model
4.1 Front Office Systems

Front office systems usually incorporate reservations/registration/billing because these three elements are linked by the high proportion of data which they use in common. In addition, such systems may incorporate a guest history system and extend to cover a greater proportion of the accounting system. By and large, it is possible to classify front office systems by size of hotel and by expense.

a) Large hotel - 400 rooms plus. Probably based on dual minicomputers able to support a large number of terminals. Direct links in to other systems and devices. Cost approximately £200,000 plus.

b) Medium hotel - 100 to 400 rooms. The main target area for small computer systems. Based on one or two microcomputers supporting less than 20 terminals. Uses a hard disk and is able to maintain guest history and accounting. Cost in the range £18,000 to £60,000.

c) Small hotel - 50 rooms plus though may be smaller depending on the turnover and type of business. Stand alone microcomputer supporting perhaps 4 terminals, probably using a hard disk. A particular feature of this type of system is that they are user programmable and may very well be employed in a variety of other roles. Cost from £2,500 upwards.

Another important communication sub-system needed in accommodation management is that of room status systems. Such systems provide good examples of the need for integration in design, the advantages of advanced provision for systems at the prior to hotel opening and the overlap of technologies with which system needs may be met. Room status systems connect reception, cashiers and housekeeping departments along with possibly uniform services and maintenance. They may be supported by conventional electrical relays, front office computer systems, telecommunication computer systems or electronic security systems.
4.2 Food & beverage systems

Food and beverage is much less significant in terms of its contribution to profitability but food and beverage systems are of interest to hospitality managers because of the difficulties of cost control in this area. Broadly, three types of system are available.

a) Catering Information System

A catering information system or CIS is of the type devised in connection with this research. As distinct from manual systems, it provides real cost control in a food area. Such control is not possible on a manual basis due to the sheer volume of data involved. Benefits are expected in the accuracy of information, cost management and even food quality. A CIS bases its reports on a file of recipes which are priced up to the minute for every ingredient cost change. The computer is used to calculate menu costings and summarise stores requisitions based on production forecasts. It may also be used for menu planning. In addition, stock control is possible for both main stores and kitchens. Reports are generated analysing sales histories (the basis of future forecasts) and identifying production cost variances. Installation costs range from £5,000 up to about £20,000 depending on features.

b) Stock Take Systems

Stock take systems conform to designs employed in retailing and manufacturing industries. In hotel and catering they are usually employed at the most primitive level based on the

\[ \text{opening stock + deliveries - closing stock} = \text{consumption} \]

formula. These are simple to operate and cheap to install. They are especially suitable for liquor control and are sometimes used in public houses well as in hotels.

c) Beverage Control Systems

Beverage control systems use sensors linked in to optics and metered
pumps. In turn, these are connected to a microcomputer or to an electronic cash register. At the end of a sales period the control system can report on actual consumption and potential revenue.

4.3 **Point of sale systems**

**a) Waiter Communication Systems**

Waiter communication systems are based on microcomputers. They support terminals on each waiter station with links to both the kitchen and the cashier. They allow the waiter to place orders or to cash up without leaving his or her station. Although they can be extended to function as a CIS this is not common. They are still quite expensive with starting prices from £20,000.

**b) Electronic Cash Registers**

The most common point of sale system is an electronic cash register or ECR. Since modern ECRs are microprocessor based, they can be programmed to perform a variety of functions. Thus the range of features employed is determined by the selection and expenditure of the end user. The most interesting developments in ECRs by late 1984 included networking capabilities and display screens, which make them very sophisticated communication systems. However, even modest ECRs can cope nowadays with sales analysis, pre-pricing and change control. A little further up market features such as inventory control, memory protection, overprint facilities and touch sensitive keyboards become available. It is a common requirement to be able to link an ECR directly into a computer system and this can be achieved in several ways, ranging from a direct cable link to a portable disk.

4.4 **Telephone systems**

Telephone control computers have until recently only been installed in large hotels, connected to minicomputer systems. However, changes in the price and performance of microcomputers have seen falls in end user costs from from around £30,000 in 1980 to about £7,500 upwards in 1985. Benefits are associated with more accurate customer billing, improved
guest service and better management information. Telephone systems may also be used as the basis of other functions. Connected to a front office system they can be used for room status information and housekeeping maid location systems or, independently, they can provide a security system.

4.5 Security systems

Security systems also tend to be used by larger hotels and by private hospitals. Controlled by a small computer in the front office they can be operated by magnetic cards, magnetic keys or digital pads. Their value lies in providing a unique locking code for each guest arrival. Due to high retrofit costs they are usually installed only in new hotels. Per door, they cost 4 to 8 times as much as a mechanical locking system but they have a number of payoffs. They support better guest service for access control, they may be used as a timekeeping system and may support a personnel location system. In the long run, insurance costs are reduced and the possibility of having to re-install a complete new locking system does not arise.

Other back of house security systems may be based on motion detectors, closed circuit TV and seismic sensors.

4.6 Energy control

Relatively low cost installations using microprocessors have been shown to have payback periods ranging from 6 to 24 months. Widely used in hotels both big and small. Many types of device are involved including load cyclers, peak power demand controllers, chiller optimisation controls and automatic shut off systems.

4.7 Guest room facilities

a) Vending systems: which are linked directly to the front office billing machine are used in medium size to large hotels. They are quite expensive to install and maintain and depend on well organised food and beverage servicing procedures to operate reliably.

b) In-room entertainment: may be controlled either through the telephone
or the video system and is based on a billing system associated with the use of certain channels on a TV.

c) Automatic wake-up services: allow the hotel to simultaneously call many rooms at an appointed time and to play a pre-recorded message.

d) Fire and smoke alarms: which operate through either the telephone or the TV system. The key factor for most guest services tends to be the cost of trunking for cables. Systems which can "share" cabling are therefore attractive for reasons of cost.

4.8 Videotex

Videotex describes television services controlled by a computer. Unlike the successful French Minitel system, other telephone based systems such as the British 'Prestel' or the Japanese 'Captain' are charged on a per call method. Broadcast systems are usually free. In-house videotex can be supported by a microcomputer and may even pay for itself through sales of advertising space to local businesses.

4.9 Microprocessor controlled catering equipment

The trend in catering is to recognise that most employees are not highly trained, well motivated chefs, but semi or unskilled people who are taking a job for monetary reward. For consistency and quality control therefore more intelligence is being built into the catering equipment so that service standards can be maintained without worrying too much about the need for heavy training costs and close, skilled supervision. Intelligent equipment costs about 5 times as much as conventional equipment for a similar function.

4.10 Stand-alone microcomputer systems

Three important software packages can be put to work directly in many hospitality businesses, using hardware costing from as little as £450 in 1985. For larger business microcomputers, the software only price typically costs in the region of £450 to £750 per package.
Computers and Innovation in the Hospitality Industry

Chapter 5

a) Word processors: are simply computers which have been programmed to manipulate text. As a marketing ploy, some companies have attempted to differentiate word processor and computer products. This has been more or less successful and it is possible to find hospitality managers who believe them to be distinct types of machines. They do not recognise that almost all business computers can handle word processing adequately. They may be used for standard letters in reservations, personnel, banqueting or accounting, and for contract forms, menus and lists.

b) Spreadsheet packages: have had enormous success in establishing the value of small computers to managers. A spreadsheet can act as the basis of budgeting, accounting, breakeven analysis, menu costing or even stock control. For more sophisticated applications a financial planning system (FPS) may be purchased at the upper end of the price range (£750).

c) Database managers: provide for filing and record systems, somewhat along the lines of a card index. They may be set up to deal with guest histories in rooms, restaurants or banqueting or with back of house functions like accounting, stock control, planned maintenance systems or even sales planning and control. A database management system (DBMS) may be used to address specific problems of maintaining files and the more difficult problem of analysing data files so as to produce management reports.

5 The Move Towards More Sophisticated Decision Support Systems in Hotel and Catering Organisations

In the very early days of commercial computing a British company, J. Lyons Ltd. was at the forefront of the field. It manufactured and sold one of the world's first commercial computers, the LEO (Lyons Electronic Office) Mark 1. Although it withdrew from manufacture, Lyons continued its interest in computers and, during the 1960s, ran reservation systems for several central London hotels all in excess of 400 rooms, on computers less powerful than most current domestic machines. Despite this, the use of computers in hotels, prior to the introduction of microcomputer based packages by Hoskyns Systems in 1978 was not widespread. An investigation
by Gamble (28) in 1978 identified only 41 computer systems in use by hotel or catering organisations in the United Kingdom and several of these were located in corporate central offices where they were used for accountancy.

Unfortunately, the design, the marketing and capabilities of some hotel computer systems clearly reflect this. It is evident from a consideration of the descriptions given in section 2 above that hotel and catering information technology is largely operated at the clerical level. There are very few examples even of administrative systems and no examples of tactical decision support systems. The survey data in chapter 6 confirms this view empirically.

Based on a small investigation, using various unpublished and to some extent unspecified sources of data which are not claimed as statistically significant, Gainsley (29) identified a mis-match between the perceptions of hotel managers and those of computer vendors, concerning the role of computer based technology in hotels. He suggests that this is because the vendor is targeting his product at the hotel manager rather than the true end user, the hotel guest. Gainsley argues, without evidence, that hotel managers' needs are enmeshed in those of guest requirements. Of more interest is the suggestion that hotel managers see a greater role for computers than do vendors. It may be that managers are looking for structure in decision making from computers where none exists at present. It may also be that the products being offered to hotel and catering organisations are designed to minimise threat potential by emphasising similarities to manual procedures, rather than differences.
### Characteristics of Successive Computer Generations

<table>
<thead>
<tr>
<th>Generation</th>
<th>Hardware</th>
<th>Software</th>
<th>Main Memory</th>
<th>Speed (MIPs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>Valves</td>
<td>Machine code</td>
<td>2 Kbytes</td>
<td>.0002</td>
</tr>
<tr>
<td>1946 - 1956</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second</td>
<td>Transistors</td>
<td>High level</td>
<td>32 Kbytes</td>
<td>.2</td>
</tr>
<tr>
<td>1957 - 1963</td>
<td></td>
<td>FORTRAN, COBOL,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>BASIC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Third</td>
<td>Semiconductors</td>
<td>Advanced</td>
<td>5 Mbytes</td>
<td>5</td>
</tr>
<tr>
<td>1964 - 1981</td>
<td></td>
<td>applications,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Timesharing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fourth</td>
<td>VLSI</td>
<td>Expert systems</td>
<td>8 Mbytes</td>
<td>30</td>
</tr>
<tr>
<td>1982 - 1989</td>
<td>Optical disks</td>
<td>ADA, LISP, PROLOG</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fifth</td>
<td>Parallel architecture,</td>
<td>Concurrent</td>
<td>10 Mbytes</td>
<td>100</td>
</tr>
<tr>
<td>1990 -</td>
<td>Laser</td>
<td>languages</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reasoning programs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>processors</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MIP = Million Instructions per Second  
VLSI = Very Large Scale Integration
5.1 *Intelligent Manipulation of Data*

Table 15 describes some of the developments that have taken place in the design and performance of computer systems since the invention of electronic devices based on Von Neuman architecture. Over the great majority of this period, commercial applications of computers have in general been concentrated in clerical and process control applications. Management interest in computers probably stems from 1978 when the advent of the microcomputer coupled with the design of a radically new piece of software, the spreadsheet, brought the benefits of computer power directly into managers' offices.

Whilst this has increased management uses of computers, the main application of these devices has been in the areas of text processing, file management and numerical calculation. There have been no real improvements in the application of computers as decision support systems.

The computer industry has approached this problem initially by making the assumption that the fault lay mainly in the man/machine interface rather than in any inherent weaknesses in hardware and software. It was felt that if managers could avoid the need to learn keyboard skills and even avoid using computer jargon then they would be more inclined to make use of computer systems. Following research carried out at the Xerox Palo Alto Research Park in California, the Apple Computer Corporation invested 200 man years of development effort in manufacturing a computer system that could be driven by a pointer device.

Apple's Macintosh computer series, launched in 1981 thus initiated an attempt to make the man/machine interface less daunting. Files were renamed as "folders" and the system was to be driven by an electromechanical device known as a mouse. Actions required by the user were achieved by moving the mouse over a flat surface. This moved a corresponding pointer on the computer's display screen to symbols (icons or pictures of objects) representing choices or files. Where a series of choices were to be presented these were offered by menus which dropped down when pointed to by the mouse. Such systems became known as "WIMP" systems, standing for Window, Icon, Mouse, Pull-Down-Menu systems.
This alternative to driving the computer by means of a pointer as opposed to a keyboard may have increased sales as a result of clever marketing but does nothing to alter the fact that most computer systems are currently not designed to deal with the type of data used in management decision making.

The initiative for the design of computer systems that could deal with problems more intelligently is generally attributed to the inception of the Fifth Generation project in Japan. To some extent, such credit would be misplaced. Philosophers have had an interest in thinking machines for centuries. However, between 1976 and 1980, the Japanese government committed over £600 million to the development of the next generation of computer systems including optoelectronic and bioelectronic devices. By contrast, the equivalent European ESPRIT (European Strategic Programme of Research on Information Technology) project funded with £1,000 million, did not start until 1984.

Japanese interest in machine intelligence stemmed from a need for computerised translation systems. Few people in the world’s major markets speak Japanese so that good translation facilities are important to a trading nation. Amongst other outcomes, sophisticated language translation devices would enable Japan to take on Western computer companies more effectively. Automatic translation between languages is a complex problem. Dumb computer programs that undertake this task tend to translate colloquial phrases like, "out of sight, out of mind" as, "blind idiot". In order to do a good job, a computer has to "understand" what it is translating.

A computer system of this type is referred to as "intelligent". The research behind the development of intelligent systems has led to the design of new types of software based on logic or declarative techniques (as opposed to procedural languages currently in use). It has also led to a recognition that serial devices based on conventional Von Neuman architectures will be too slow for the amount of processing involved. Thus parallel architectures, bio-computers and optical computers are all under development in a search for greater speed.
5.2 Expert Systems for Management

The earliest "intelligent" computer program actually dates from 1965. DENDRAL is a system for inferring the structure of unknown chemicals using mass spectrometry data. It is a typical example of its kind. Bramer (30) in cataloguing projects in this area shows that they concentrate on problems with a well established knowledge base, in which issues can be resolved diagnostically using Bayesian approaches. In the United Kingdom, they are known as intelligent knowledge based systems or IKBS, elsewhere they are generally known as expert systems.

An IKBS is a kind of smart database. More precisely, a knowledge based program uses knowledge incorporated as facts and rules. Obviously enough, an intelligent knowledge based program seeks to do so "intelligently". Herein lies the nub. There is a problem in the use of the term "intelligent". The definition preferred by many researchers in the field of artificial intelligence (AI) is that an "intelligent" computer program performs actions which are considered intelligent when performed by a human being. Such a definition actually moves little further forward. Some activities which people do not regard as requiring great intelligence like image recognition (seeing), verbal communication (speaking), hand/eye co-ordination (picking things up), are considerably more complex for machines. On the other hand, activities such as performing integral calculus which humans may think of as "hard", is quite straightforward for a computer.

In the same way that the word database is used for both data files and database programs, the terms IKBS and expert systems are often freely interchanged. To muddy the waters even further, some forms of IKBS are very close to existing database formats. It can be difficult to distinguish the operational function of a dumb IKBS or expert system from a relatively bright database. Possibly attempting to distinguish the two is a rather barren exercise as there may be a degree of convergence between database and expert system technology. However there is a crucial difference between approaches to knowledge based programming and conventional database systems. These hinge principally on whether the data is stored in the form of a rule or not. A database uses procedures to perform actions, a knowledge based program uses rules to define
Goodall has defined an expert system as,

"a computer system that uses a representation of human expertise in a specialist domain, in order to perform functions similar to those normally performed by a human expert in that domain". (31)

Goodall uses this explanation to derive an operational definition of an expert system. In his view an expert system has two components, knowledge and an inference engine to derive conclusions from the knowledge. The exact nature of the knowledge and the way in which conclusions should be inferred are left suitably vague.

A more conventional view is that of the British Computer Society (BCS) specialist group. According to the BCS formal definition, an expert system is regarded as,

"the embodiment within a computer of a knowledge-based component from an expert skill in such a form that the system can offer intelligent advice or take an intelligent decision about a processing function. A desirable additional characteristic which many would consider fundamental, is the capability of the system, on demand, to justify its own line of reasoning in a manner directly intelligible to the enquirer. The style adopted to attain these characteristics is rule based programming". (32)

Thus an expert system has the following characteristics:

a) It is typically rule based.

b) It should have a mechanism to derive conclusions from the rules.

Ideally the expert system should also have the following additional features. The first is an ability to explain and justify its conclusions. An expert system is not meant to behave like a "black box". Black boxes do not build confidence, the user should be able to get an explanation of why the system has done something. Second and equally important, it must have the ability to handle uncertain data. Managers deal with a lot of
Uncertain data. Indeed, this is one characteristic that distinguishes many of the problems with which hotel managers have to cope.

Building an expert system is therefore not a straightforward process. A succinct expression of the problem type has been given by Carbonnel.

"Man-computer interaction essentially involves communication, elaboration, and exchange between two information structures, that of the human operator and that accessible through the computer system". (33)

In the expert system the problem is to translate the information structure of the domain expert, relevant to that domain, into the information structure of the computer. The intention is to allow the non-expert to gain access to the decisions made by the domain expert's information structure, in such a manner that the non-expert's information structure can comprehend and use the decisions.

Traditionally, expert systems have been applied in domains with a well defined body of knowledge which is generally deterministic and stable in character. In consequence, the rules are modified infrequently. If contradictions are found between rules they may normally be resolved by co-operative experimental evidence or by established practices. If the evidence and the practice are themselves contradictory this is more likely to be indicative of limitations in knowledge of the domain than of inconsistencies in the domain itself.

Management decisions by contrast are based on rules which are less determinate. Problems of perception and the political nature of decision taking in organisations lead to many contradictions in belief and behaviour. Sometimes these are simply discounted or ignored by the actors involved. Although it has been argued that technical domains are subject to these same problems to some degree, such difficulties are not integral to the problem environment to the same extent as situations which involve the management of human resources. Many management problems may not be suitable for an approach based on expert systems and other artificial intelligence techniques may be more relevant.
A decision support system for managers differs in several ways from a technical expert system. It has to cope with implicit as well as explicit changes in the problem environment and with apparent contradictions. The transaction rate (the number and frequency of decisions) on such systems is also higher. Both problem recognition and the applicability of chosen outcomes are ambiguous. Taken with a more complex form of uncertainty the scope of management expert systems is probably going to be narrower than that of their technical counterparts.

The front office of a hotel (dealing with reservations and registration) would provide an ideal area in which to design and test management expert systems. The accept/refuse decision is critical to business performance and lends itself to a complex form of evaluation. There is a wide range of price discretion since marginal costs are low. However, in the long run, high fixed costs must be covered. Business policies, the behaviour of different market segments, the strength of current demand and the available resource are all relevant to the problem.

An intelligent hotel front office system would aim to incorporate the expertise of a skilled front office manager into a computer so that it can be used routinely by reservation clerks. This goes a long way beyond simply recording reservations like the electronic clerks of existing computerised front office systems. Indeed, existing hotel front office systems do not even monitor all relevant parameters. Like manual systems they record numbers of rooms sold, room occupancy. However they do not calculate the average price achieved for the sale of rooms, the average rate. This would be difficult to do manually on a continuing basis but presents little technical difficulty for a computer. The fact that computer systems replicate their manual counterparts in such pedestrian detail is indicative of the absence of innovative insight by hospitality managers.

In the case of a hotel based expert system, built for use by hotel personnel, the problem of construction may not be as severe as it may first appear. It can be assumed that there will be some common cultural and procedural assumptions between the source expert and the end user. Reservation clerks generally have a good understanding of what their department is trying to achieve so that the cultural and procedural...
translation needed for some problems is not required. Therefore, the principal task is to "capture" the relevant part of the experts information structure and place that in the machine. As Mrs. Beaton would have it, first catch your expert.

Thus, the usual way of building the knowledge base is to elicit the knowledge from a willing expert. It can be rather difficult to find an expert with the patience to talk about how he or she makes some decisions. Even the availability of a co-operative expert may not help. Michie (34) describes conditions in which experts were unable to rationally explain the basis of certain decisions that they took, during an exercise in knowledge elicitation. This underlines the difficulty of understanding decision making processes.

A pilot study to develop an expert hotel front office system has been described by Smith and Gamble (35). In terms of conventional systems, it makes some interesting departures from accepted expert system practice. For example, the domain rules and domain data are dynamic, (dynamic rules may be described as policies). Thus in addition to being able to learn by itself, the expert system has to incorporate a training module so that it can be taught new policies. This in turn requires some variation from accepted rule formats. Secondly the system incorporates and uses forecasting techniques not in general use by the experts from whom it was derived.

6 Summary of the Uses of Information Technology in Hotel and Catering Organisations

Developments in microelectronics, which have resulted in major advances in engineering, communications and computer science offer the possibility of change in the way that computer power can be made available to managers. High cost computing devices necessarily have to be shared and this constrains their application. Low cost devices allow computers to be deployed cheaply throughout an organisation for a variety of purposes. It might therefore be expected that studies which concerned themselves with the installation of large, expensive computer systems, many of which were cited in chapter 4, relate to a different class of problem. The microcomputer does not require a specialist technical support staff, has
minimal financial consequences for the organisation but potentially impacts more directly on the manager.

A description of the use of computers in hotel and catering organisations shows that they are generally confined to low level data processing tasks, consistent with the psychological constructions of managers identified in chapter three. Although more advanced roles for computers can be envisaged, ranging from administrative functions through to tactical and strategic decision support systems, writers have identified few applications that go even as far as these administrative applications.

The range of technologies with which hotel managers may have to cope is wide ranging and potentially complex. Computer based procedures may be used in both specialist domains, such as reservation management or food management, technical domains such as process control in heating, air conditioning and ventilation systems or in general administration. Requirements may be met by a variety of overlapping technologies for which the relative efficiency is hard to determine even for an expert. This has led to a piecemeal approach by hotel and catering organisations in which many stand alone systems are employed. The computers in administrative systems are valued for their contribution to data processing activities and play a minimal role in their contribution to decision support systems.

Research in the realms of artificial intelligence has led to speculation that computer based procedures may take a more productive part in decision support. Several expert systems have been designed in the last twenty years that seek to encode human expertise in a computer program. These have generally concentrated on diagnostic situations where the problem was one of classification, principally in scientific, medical and engineering applications. This is markedly different from the ambiguous problem environments encountered by managers. It may also be argued that political pressures form a more important element in organisational decision making than in scientific diagnosis though such a position is not incontrovertible.

Many important researchers in the field of artificial intelligence, such as Weizenbaum (36), cited in chapter 3, are of the opinion that human decision making is too subtle, too inherently human to ever lend itself to
a machine based process. Other analysts such as Feigenbaum (37) are not convinced that human expertise is always a black hole of inscrutability. Perhaps a balanced position is best expressed by Weiss and Kulikowski.

"From a social point of view, expert systems are likely, in the next two decades, to help systematize the more well-established reasoning procedures used by experts. They will not replace experts, but rather help people move into more intellectually challenging activities where the knowledge encoded in an expert system is another routine source of information." (38)

The displacement of clerical procedures by computer driven clerical procedures has minimised the differences between manual and computer based systems. This approach reinforces the view of computers as data processing devices. Instead new ways of thinking about organisational functioning are required. Pilot studies in the development of expert systems for hotel and catering management show that an entirely different conception of the application of computer based procedures is required. The catering information system developed as part of this research is not an expert system but did employ a different form of problem representation to that conventionally applied in food cost control systems.

Eason (39) has pointed out that information technology has implications for job numbers, job content, skills and training, formality, power and influence in organisations, personnel policies and industrial relations and for systems design. He does not argue that these effects need be either unconsidered or uncontrolled. Rather that organisational needs should be identified and the way in which these are to be met by technology should be specified by managers.

Existing applications of information technology in hotel and catering organisations can only be described objectively as minimally useful and difficult to use. Not even the developments in man/machine interface research have been applied to hospitality systems. The computer systems installed make extensive use of codes and are usually menu driven from keyboards. Appendix 6 contains an example of a training aid for a hotel computer system, illustrating a wide the range of functions and the extensive use of mnemonic codes. It may be argued that they are deployed
Computers and Innovation in the Hospitality Industry

Chapter 5

in such a way as to support existing value and control structures in hospitality organisations.

There is no obvious evidence to reveal the presence of innovative insights by hospitality managers. This may be due to factors inherent within the managers and chapter 6 will explore the extent to which the perceptions of hotel and catering managers might differ from those of other professional managers. It may also be due to the short period of time during which observable effects might be noted. Mansfield (40) reckons that the period between the invention and innovation of television was as long as twenty two years. A comparison between microcomputers and television is not unreasonable and the rate of diffusion can be measured from 1978 at the earliest or possibly 1981 at the latest. 1981 is the year in which IBM made microcomputers respectable by entering the small computer market place.

However, it must also be remembered that there are no inevitable reasons why organisational change should occur in response to technology. Important adjustments in society as a whole may need to take place before hotel and catering organisations prepare themselves to reflect the culture in which they exist. Amongst others, Coombs and Green (41) have noted inconsistencies between views of a technology that will both increase productivity (thus reducing employment) and support increased effective demand. In service industries at least this conflict is apparently reconciled by the unimaginative nature of existing applications which seem to support growth without displacing labour. In social terms therefore, this jobless growth is perhaps more acceptable than other possible alternatives.
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<table>
<thead>
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<th>Reference</th>
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<tr>
<td>40 Mansfield E.</td>
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</table>
The Impact of Information Technology in the Hospitality Industry
and a Comparison of Some Attitudes of Hospitality Managers to Computers

1 The Nature and Purpose of the Survey

Problems of definition, size and extent exacerbate the difficulties of estimating the penetration and usage of information technology within the hotel and catering industry. The analytical difficulties that this situation presents were discussed in chapter 1. However, a survey was necessary in order to obtain a general fix on the possible effects of management attitudes on the rate of computer innovation in this industry. The survey was intended to elicit three sets of information which could be used to provide a generalised perspective on the data obtained from the cognitive maps and from the case studies. The purposes of the survey were:

a) To consider the nature of the contacts between hospitality managers and the computer industry. To examine the background and training of hospitality managers and to assess their level of exposure to information technology.

b) To assess the applications of computers and information technology within the hospitality industry in terms of range and value and to appraise the reactions of managers to the service provided for them by the computer industry.

c) To discover whether the attitudes of hospitality managers could be considered to differ significantly from those of other professionals in respect of computers and information technology. This was the principal purpose of the survey.

1.1 Methodology

The first social survey to employ sampling methods was made by Bowley in 1912 (1). The method is well established and well documented as a method
of social science investigation. The principles employed in this survey have been described by many authors. The approach used for this survey draws heavily on the work of Moser and Kalton (2). Questionnaire design and the choice of questions follows the principles explained by Oppenheim (3) and Payne (4). In technical terms, the limitations which surrounded the conduct of the survey resulted in conditions which were far from ideal. The choice of method was severely constrained by intention, resources and opportunity.

The resources and opportunity were limited by finance and access. Large scale surveys are expensive. A budget of only £1,000 was available of which £350 was donated by the Hotel, Catering and Institutional Management Association (HCIMA), the hospitality industry's professional institute. The balance was contributed by the Department of Management Studies for Tourism and Hotel Industries at the University of Surrey. Funds therefore precluded direct interview techniques if a representative sample was to be obtained. In view of the fact that the survey was to be directed at managers, deemed capable of dealing with a reasonably well designed form, a self completion questionnaire was considered a suitable vehicle.

Fortunately, in addition to agreeing the funds, the HCIMA also kindly offered the facility of inserting the questionnaire in the April 1984 issue of their membership magazine, *Hospitality*. This both allowed the possibility of access to an appropriate target population and reduced the amount of mailing costs to be met. When approached in February 1984, the HCIMA pointed out that they intended to run their own membership survey in June of that year. In order to avoid possible conflict and overlap they suggested that the information technology survey be circulated no later than April. The survey form had therefore to be prepared and printed no later than March.

Survey design took a number of factors into account. The first of these was the intention to obtain a comparison of hospitality management attitudes with those of other professional managers. In 1980, Zoltan and Chapanis (5) conducted an investigation of attitudes to computers in the United States. Although their survey was aimed at highly educated professionals such as physicians, accountants, lawyers and pharmacists, this was considered to be the basis of an interesting comparison. Apart
from the work of Lee (6), very few general attitudinal studies on computers have been carried out. Thus part of the survey form duplicated a section of the Zoltan and Chapanis study with a view to making comparisons.

Additional questions to ascertain the context and application of information technology were added to precede the attitudinal section. In order to test for possible ambiguities particularly in this early section, twenty copies of the entire questionnaire were issued as a pilot study. No difficulties with the form of questioning were encountered from the pilot returns. It should be noted that the pilot copies were individually delivered to each subject. The pilot forms were not encountered as an insert in a magazine. Piloting was satisfactory and no difficulties were experienced with main survey returns other than that the response rate was not as high as anticipated. However, since other mechanisms for delivery and return of the survey forms were not available, it is difficult to imagine how response rates might have been improved.

The construction of the first section was therefore empirical and the second section largely reproduced the design piloted in the United States. From a cursory examination of the final questionnaire included in appendix 7, it is immediately apparent that the range of data which it aimed to collect was extensive. As such it is exposed to a criticism that might be levied at many surveys.

"As with most surveys, too much information was sought, and this may have resulted in the disappointing response rate. . . The small numbers in some sub-groups reduced the value of such detail, and in retrospect a shorter questionnaire seeking more limited information would have probably produced similar results . . " (7)

8,000 survey forms were printed and distributed in the April 1984 issue of Hospitality magazine. The print run of Hospitality is 22,000 issues and the questionnaire was included in the only category which was conveniently identifiable by the association's addressing system, that for full members. This excluded licentiates, student and associate members, unlikely to occupy senior management positions. Unfortunately it also excluded fellows of the association, those most likely to be in senior
management positions. The response of 328 usable forms received by the
cutoff date of July 1st. 1984 represents a rate of 4.1%.

Given the nature of the questionnaire, the response rate might be regarded
more properly as a tribute to the patience and interest of the HCIMA
membership. The survey itself requires over 200 responses, which is
somewhat lengthy for a self completion form, its very size acting as a
deterrent. Little could be done to offset this lengthy character by
improving the attraction of the design and layout. The presentation is
inexpensive, A3 sheets being photo reduced to standard A4 from a typed
original.

The contact conditions were far from ideal. The survey was not personally
addressed, there was no preceding mail shot to invite participation nor
any follow up by letter or printed insertion to elicit late replies. All
of these conditions could have been offset given greater resources. For
example, the comparative American survey used nine pages including a
personalised first page to present less questions which obtained a 27.7%
response rate.

As a response rate the percentage is undoubtedly low. However, a pool of
328 full members of the industry’s professional management association
provides a statistically valid sample for the intended purposes, given the
large size of the target population. The response appears to be
reasonably representative with no evidence of unexpected bias. The size
of the sample allows for adequate comparison with other relevant surveys
and with the work of Zoltan and Chapanis.

1.2 Description of the Survey Form

It will be observed from the example in appendix 7 that the survey form
can be divided into 3 sets corresponding to the broad groupings described
in section 1, for which data are required.

a) Question 1 determines the nature of the respondent’s business and
questions 2 and 3 his or her contact with computers and information
technology. Questions 17 and 18 merely obtain personal profile data
and were listed at the end of the form so as to emphasise the
anonymity with which data were to be held.

b) The second set of questions is concerned with levels of application and usage plus identification of the perceived influence that this level of management might have on decisions to install or replace computer based systems. Thus questions 4 through 8 probe actual computer usage and levels of satisfaction. Questions 9 and 10 look at actual and intended areas of application. Finally, questions 11 to 14 seek to discover who might initiate installation or removal of computer systems in hospitality organisations.

c) The main thrust of the survey, occupying half the total survey form, seeks to reproduce the main part of the Zoltan and Chapanis survey so as to provide a basis of comparison. Questions 15 and 16 largely imitate their approach. Some additional questions were added in an attempt to isolate factors that might be related to cultural bias and to attempt to support more closely the data obtained from cognitive mapping.

1.3 Data Analysis

Survey forms were coded by hand and punched into a Prime 750 minicomputer by the University of Surrey data preparation service. Results were analysed using the Statistical Package for the Social Sciences (SPSS), version M, release 9.1 of August 1982 (8).

2 Respondent Profile and Contact with Computers

2.1 Age Range, Qualifications and Job Type

Table 16 describes the age and sex of respondents. Approximately 70% of respondents were male. The Hotel and Catering Industry Training Board data for 1984 (9) suggest that only 55% of managers are male. The discrepancy might be accounted for in terms of interest in the subject of information technology.

46% of respondents were aged between 30 and 39 and the mean age of the grouped data was calculated from a formula given by Kazmier (10) as 36.7
years. It is apparent from the data that the age ranges conform approximately to a normal distribution.

The Education and Training Advisory Council report of 1983 (11) suggested that the level of education and training in the hospitality industry is low. Only 10% of full time employees were reported as holding a supervisory or management qualification. In this survey, directed entirely at the membership of a management association, a higher proportion of qualified respondents might be expected. As table 17 shows, this was not the case. Just over 14% of respondents claimed a graduate or postgraduate level of qualification. Just over a quarter of the sample held an HND and nearly 45% were certificated at a craft level. The small proportion of unqualified managers can be accounted for by a procedure which allowed managers to join the HCIMA on the basis of background and experience. Although this procedure was terminated several years ago some older managers in the association could hold no formal qualification.

By far and away the bulk of qualifications, almost 80%, were in hotel and catering subject areas. The proportion of managers qualified in specialist areas was very low though interestingly, 4 respondents held a computing qualification.
TABLE 16

Respondent Profile

### Sex of Survey Respondents

<table>
<thead>
<tr>
<th>Sex</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>214</td>
<td>69.93</td>
</tr>
<tr>
<td>Female</td>
<td>92</td>
<td>30.07</td>
</tr>
</tbody>
</table>

n= 328

### Age Range of Survey Respondents

<table>
<thead>
<tr>
<th>Age</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 20</td>
<td>3</td>
<td>.99</td>
</tr>
<tr>
<td>20 - 29</td>
<td>66</td>
<td>21.71</td>
</tr>
<tr>
<td>30 - 39</td>
<td>141</td>
<td>46.38</td>
</tr>
<tr>
<td>40 - 49</td>
<td>68</td>
<td>22.37</td>
</tr>
<tr>
<td>50 - 59</td>
<td>22</td>
<td>7.24</td>
</tr>
<tr>
<td>&gt; 60</td>
<td>4</td>
<td>1.32</td>
</tr>
</tbody>
</table>

n = 328

Mean = 36.71
S.D. = 9.27
### TABLE 17

**Respondent Profile - Qualifications**

**Respondents' Qualification Level**

<table>
<thead>
<tr>
<th>Qualification Level</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postgraduate degree or diploma</td>
<td>18</td>
<td>5.98</td>
</tr>
<tr>
<td>Graduate</td>
<td>25</td>
<td>8.31</td>
</tr>
<tr>
<td>Diploma in Management Studies</td>
<td>14</td>
<td>4.65</td>
</tr>
<tr>
<td>Higher diploma</td>
<td>83</td>
<td>27.57</td>
</tr>
<tr>
<td>Ordinary diploma</td>
<td>10</td>
<td>3.32</td>
</tr>
<tr>
<td>Professional qualification</td>
<td>0</td>
<td>.00</td>
</tr>
<tr>
<td>Craft certification</td>
<td>134</td>
<td>44.52</td>
</tr>
<tr>
<td>Other/none</td>
<td>17</td>
<td>5.65</td>
</tr>
</tbody>
</table>

\[ n = 328 \quad 301 \]

**Subject Area of Respondents' Latest Qualifications**

<table>
<thead>
<tr>
<th>Subject Area</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotel &amp; catering management</td>
<td>237</td>
<td>79.80</td>
</tr>
<tr>
<td>Business management</td>
<td>19</td>
<td>6.40</td>
</tr>
<tr>
<td>Computing</td>
<td>4</td>
<td>1.35</td>
</tr>
<tr>
<td>Food &amp; beverage</td>
<td>13</td>
<td>4.38</td>
</tr>
<tr>
<td>Marketing/sales</td>
<td>1</td>
<td>.34</td>
</tr>
<tr>
<td>Accounting</td>
<td>2</td>
<td>.67</td>
</tr>
<tr>
<td>Personnel</td>
<td>8</td>
<td>2.69</td>
</tr>
<tr>
<td>Other/none</td>
<td>13</td>
<td>4.38</td>
</tr>
</tbody>
</table>

\[ n = 328 \quad 297 \quad 100.00 \]
TABLE 18
Respondent Profile - Area of Activity

Respondents’ Type of Work

<table>
<thead>
<tr>
<th>Respondents’ Jobs</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>General management</td>
<td>148</td>
<td>47.28</td>
</tr>
<tr>
<td>Department manager</td>
<td>106</td>
<td>33.87</td>
</tr>
<tr>
<td>Supervisor or assistant manager</td>
<td>23</td>
<td>7.35</td>
</tr>
<tr>
<td>Operative (kitchen/bar etc.)</td>
<td>8</td>
<td>2.56</td>
</tr>
<tr>
<td>Consultant</td>
<td>8</td>
<td>2.56</td>
</tr>
<tr>
<td>Staff manager</td>
<td>5</td>
<td>1.60</td>
</tr>
<tr>
<td>Lecturer</td>
<td>15</td>
<td>4.79</td>
</tr>
</tbody>
</table>

n = 328

Main Focus of Respondent Activities

<table>
<thead>
<tr>
<th>Respondent’s area of work</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>106</td>
<td>35.45</td>
</tr>
<tr>
<td>Rooms</td>
<td>19</td>
<td>6.35</td>
</tr>
<tr>
<td>Food &amp; beverage</td>
<td>127</td>
<td>42.47</td>
</tr>
<tr>
<td>Marketing/sales</td>
<td>4</td>
<td>1.34</td>
</tr>
<tr>
<td>Accounting</td>
<td>6</td>
<td>2.01</td>
</tr>
<tr>
<td>Personnel</td>
<td>6</td>
<td>2.01</td>
</tr>
<tr>
<td>Purchasing</td>
<td>5</td>
<td>1.67</td>
</tr>
<tr>
<td>Other</td>
<td>26</td>
<td>8.70</td>
</tr>
</tbody>
</table>

n = 328

Main Business of the Unit

<table>
<thead>
<tr>
<th>Type of Activity</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central office</td>
<td>27</td>
<td>8.39</td>
</tr>
<tr>
<td>Hotel/accommodation service</td>
<td>68</td>
<td>21.12</td>
</tr>
<tr>
<td>Conference/ banqueting</td>
<td>7</td>
<td>2.17</td>
</tr>
<tr>
<td>Commercial food &amp; beverage</td>
<td>41</td>
<td>12.73</td>
</tr>
<tr>
<td>Non-commercial food &amp; beverage</td>
<td>46</td>
<td>14.29</td>
</tr>
<tr>
<td>Welfare Catering</td>
<td>92</td>
<td>28.57</td>
</tr>
<tr>
<td>Other</td>
<td>21</td>
<td>6.52</td>
</tr>
<tr>
<td>Education</td>
<td>20</td>
<td>6.21</td>
</tr>
</tbody>
</table>

n = 328
Table 18 shows that most respondents, just over 84%, were employed as line managers in hospitality areas. 35% were general managers, 6% were rooms division managers and 43% food and beverage managers. Table 18 also reveals that just over 81% were employed at general or departmental manager level. Nearly 29% of the organisations represented in the sample were involved with welfare catering and a further 14% were in non-commercial catering. 44% of respondents were engaged in the commercial sector with just over one fifth, 21% being directly involved in hotels.

The overall respondent profile is therefore a 37 year old general or departmental manager, working as a generalist in a hospitality area qualified at higher diploma level or below. The response is split on roughly equal terms between the commercial and non-commercial sectors. Although biased slightly towards male managers, the sample that was obtained is considered to be suitably representative of the middle to senior managers in the industry.

In terms of professional affiliation, 19 replies were received from fellows of the HCIMA and 1 from an associate member. Thus 6% of the sample did not fall in the expected full membership category. Of greater interest is the fact that 102 respondents, or 31% acknowledged membership of a trade union. This is greater than the 20% overall union estimated by Boella (12) in 1978 and probably reflects a higher response from people in industrial and institutional catering where union membership can be as high as 58%. In the hotel sector alone such membership is reckoned by Boella to fall to about 5%.

2.2 Size and Type of Organisation

The bias in the response towards large organisations is also indicated in table 19 which describes the distribution of annual turnover or budget and the number of employees. Almost 50% of respondents (49.66%) were from organisations with a turnover equal to or in excess of £500,000 per annum. Exact comparisons with the industry as a whole are hard to obtain since complete data are not available. An approximation can be derived from the tables presented in chapter 1. From table 2 it would appear that the hotel sector had a turnover of £3,173m in 1984. Divided by the 52,740 hotels, motels and guest houses shown in table 4, an average hotel
turnover of £60,163 is indicated. In the restaurant sector, the annual 1984 turnover of £2,813m, divided by the 64,900 restaurants, cafes and fast food outlets shown in table 5 gives an average turnover of £43,344. These averages can not be taken as anything other than indicative since they are drawn from tables constructed for a different purpose which do not use the same definition of terms. However, they are probably representative of an industry with a small average unit size. The calculated grouped mean turnover of the sample was £515,497. Even excluding the 101 respondents from organisations with a turnover in excess of £1m, the group mean is still relatively high at £290,410.

Similarly this is reflected in the staffing levels of the sample. Boella (13) estimates that 90% of establishments in the industry employ less than 20 staff and that only 2.5% employ more than 50. The mean number of employees in the survey, calculated from grouped data, was nearly 68 which falls to a mean of 37 if the largest 101 units are discounted.
**TABLE 19**

Profile of Respondents’ Organisations

<table>
<thead>
<tr>
<th>Annual Turnover or Budget</th>
<th>Turnover £000s</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;= 50</td>
<td>39</td>
<td></td>
<td>13.27</td>
</tr>
<tr>
<td>51 - 149</td>
<td>52</td>
<td></td>
<td>17.69</td>
</tr>
<tr>
<td>150 - 249</td>
<td>30</td>
<td></td>
<td>10.20</td>
</tr>
<tr>
<td>250 - 499</td>
<td>27</td>
<td></td>
<td>9.18</td>
</tr>
<tr>
<td>500 - 999</td>
<td>45</td>
<td></td>
<td>15.31</td>
</tr>
<tr>
<td>&gt;= 1m.</td>
<td>101</td>
<td></td>
<td>34.35</td>
</tr>
</tbody>
</table>

n = 328  
Mean = £515,497  
S.D. = £712,195  
(For the smallest 193, the mean = £290,410 and the standard deviation = £274,820)

<table>
<thead>
<tr>
<th>Levels of Employment</th>
<th>No. of Employees</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;= 25</td>
<td>93</td>
<td></td>
<td>30.00</td>
</tr>
<tr>
<td>26 - 49</td>
<td>60</td>
<td></td>
<td>19.35</td>
</tr>
<tr>
<td>50 - 74</td>
<td>31</td>
<td></td>
<td>10.00</td>
</tr>
<tr>
<td>75 - 99</td>
<td>27</td>
<td></td>
<td>8.71</td>
</tr>
<tr>
<td>100 - 124</td>
<td>15</td>
<td></td>
<td>4.84</td>
</tr>
<tr>
<td>&gt;= 125</td>
<td>84</td>
<td></td>
<td>27.10</td>
</tr>
</tbody>
</table>

n = 328  
Mean = 67.90  
S.D. = 49.49  
(For the smallest 209, the mean = 37.01 and the standard deviation = 23.98)
That the range of the responses is wide in each case can be seen from the large standard deviations. Hence it will be noted that small organisations are well represented in the sample response. 91 units had a turnover of under £150,000 and 93 units employed less than 25 people. Indeed almost half the response, just over 49%, came from people in organisations employing less than 50 people.

Although larger organisations are over represented in the response by estimated comparison with the industry as a whole the sample that has been obtained is considered satisfactory. It might be expected that a survey directed at members of a professional management association would under represent very small organisations in an industry with many small firms such as cafes and guest houses, operated by unqualified entrepreneurs. Small units are actually quite well represented in the sample constituting about one third of replies.

The dispersion of the sample is demonstrated even more clearly in table 20. It is evident that some respondents chose to define their unit very widely. The average hotel size in the sample is almost 129 rooms. Reference to table 4 in chapter 1 will recall the fact that over 95% of hotels in the UK are reckoned to have 100 bedrooms or less whereas in the sample, only 62% of hotel respondents fell within this category.

No figures are available for average number of meals served in a catering unit. Given the very diverse style of such units it is doubtful if such a figure would have any meaning in any case. The large daily meal outputs in the survey response are attributable to industrial and welfare catering outlets. Thus whilst about one third of respondents served less than or equal to 250 meals per day, a further third served over 1,000. The mean number of meals served, calculated at almost 2,100 is probably due to regional or district catering managers in the institutional sector returning a single figure for the several units under their control.
TABLE 20

Scale of Operation of Respondents' Organisations

<table>
<thead>
<tr>
<th>Hotel Size</th>
<th>No. of Rooms in Hotel</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 25</td>
<td>18</td>
<td>23.08</td>
</tr>
<tr>
<td></td>
<td>26 - 50</td>
<td>9</td>
<td>11.54</td>
</tr>
<tr>
<td></td>
<td>51 - 100</td>
<td>22</td>
<td>28.21</td>
</tr>
<tr>
<td></td>
<td>101 - 150</td>
<td>15</td>
<td>19.23</td>
</tr>
<tr>
<td></td>
<td>151 - 250</td>
<td>7</td>
<td>8.97</td>
</tr>
<tr>
<td></td>
<td>251 - 500</td>
<td>4</td>
<td>5.13</td>
</tr>
<tr>
<td></td>
<td>501 - 1000</td>
<td>2</td>
<td>2.56</td>
</tr>
<tr>
<td></td>
<td>&gt;1001</td>
<td>1</td>
<td>1.28</td>
</tr>
</tbody>
</table>

n = 328
Mean = 128.62
S.D. = 205.75

<table>
<thead>
<tr>
<th>Daily Meal Production</th>
<th>No. of Meals Served Daily</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 125</td>
<td>46</td>
<td>22.22</td>
</tr>
<tr>
<td></td>
<td>126 - 250</td>
<td>28</td>
<td>13.53</td>
</tr>
<tr>
<td></td>
<td>251 - 500</td>
<td>24</td>
<td>11.59</td>
</tr>
<tr>
<td></td>
<td>501 - 1000</td>
<td>24</td>
<td>13.53</td>
</tr>
<tr>
<td></td>
<td>1001 - 2000</td>
<td>24</td>
<td>11.59</td>
</tr>
<tr>
<td></td>
<td>2001 - 4000</td>
<td>23</td>
<td>11.11</td>
</tr>
<tr>
<td></td>
<td>4001 - 8000</td>
<td>12</td>
<td>5.80</td>
</tr>
<tr>
<td></td>
<td>8001 - 9900</td>
<td>1</td>
<td>.48</td>
</tr>
<tr>
<td></td>
<td>&gt; 9900</td>
<td>21</td>
<td>10.14</td>
</tr>
</tbody>
</table>

n = 328
Mean = 2099.49
S.D. = 3093.57
Table 21 examines the computer background and training of respondents. It appears that 39% of hospitality managers have received no formal training in this area. Indeed a substantial proportion of respondents neither use computers, 30%, or even encounter them at work, 25%.

Given that just over 94% of the sample have received some formal higher or further education, a low proportion of under 20% were given academic training involving computers at college or school. It might be expected that younger managers were more likely to have received such training but this is not the case. There is no significant age related difference between groups, \( X^2 = 5.81, df = 5, p < 0.05 \). Since most of these managers would have completed their formal training in the early 1970s few colleges offered computer based hotel and catering courses during that period. There is some evidence of personal development. One quarter of the managers have received training in computer use at work and a further 20% have trained themselves.

Surprisingly, 30 managers or 9% of the sample claim to have written computer programs that they use in their work and just over one fifth, 21% have written a program of some kind. This is the same proportion of managers that have computers in their offices. In addition almost a quarter of managers have a computer at home.

In the survey conducted by Zoltan and Chapanis, carried out in 1980 (14) a higher proportion of professionals had never used a computer, 43% as opposed to 30% of hospitality managers. This is despite the fact that almost 31% of the American managers had received formal training in computer use. Zoltan and Chapanis were sampling chartered accountants, lawyers, pharmacists and physicians. Although the difference can be partly explained by low usage rates from lawyers and physicians, accountants were shown to have high usage rates. The passage of four years between the two surveys is likely to have had a major effect in levels of utilisation and ability.

In 1981, executive search consultants Heidrick and Struggles (15) conducted an information technology survey amongst large organisations,
with a minimum annual turnover in excess of £50m. Targeted at Directors of Management Services they obtained 156 responses. Only 18% of their sample came from service industries. A further difference from Gamble's survey is that Heidrick and Struggles' managers were older (average 50 years) and more highly educated (48% were graduates). One of their findings indicated that 18% of organisations were using personal computers. This was predicted to rise to 46% by 1983 though the prediction cannot be validated. By comparison, 30% of respondents to question 4 had one or more microcomputers in their department in 1984.

Statistically, direct comparisons are difficult. However, it does not appear that levels of computer utilisation in hospitality managers are markedly lower than that of other professional or managerial groups. This is despite the fact that levels of education are lower and that they are less likely to have received formal training in computer usage. Three quarters of all hospitality managers in the sample work in an environment where they are exposed to some computer utilisation though it would appear that approximately 43% do so only via computer generated reports and that only 23% are active, direct users at work.
### TABLE 21
Management Training and Usage of Computers

<table>
<thead>
<tr>
<th>Hospitality Management Training on Computers</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Used them at college/school</td>
<td>58</td>
<td>17.68</td>
</tr>
<tr>
<td>Trained to use them at work</td>
<td>84</td>
<td>25.61</td>
</tr>
<tr>
<td>Trained to use them myself</td>
<td>93</td>
<td>28.35</td>
</tr>
<tr>
<td>Never used one</td>
<td>128</td>
<td>39.02</td>
</tr>
<tr>
<td><strong>n = 328</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Percentages do not total 100 due to multiple response

GAMBLE 1984 (UK)

<table>
<thead>
<tr>
<th>Management Ability to Use a Computer</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have written my own program</td>
<td>69</td>
<td>21.04</td>
</tr>
<tr>
<td>I have used my own program at work</td>
<td>30</td>
<td>9.15</td>
</tr>
<tr>
<td>I have used another’s program</td>
<td>148</td>
<td>45.12</td>
</tr>
<tr>
<td>I had another person use it for me</td>
<td>43</td>
<td>13.11</td>
</tr>
<tr>
<td>I never used one or had one used</td>
<td>100</td>
<td>30.49</td>
</tr>
<tr>
<td><strong>n = 328</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Percentages do not total 100 due to multiple response

ZOLTAN and CHAPANIS 1980 (USA)

<table>
<thead>
<tr>
<th>Management Ability to Use a Computer</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have written my own program</td>
<td>90</td>
<td>17.50</td>
</tr>
<tr>
<td>I have used my own program at work</td>
<td>75</td>
<td>14.60</td>
</tr>
<tr>
<td>I have used another’s program</td>
<td>160</td>
<td>31.30</td>
</tr>
<tr>
<td>I had another person use it for me</td>
<td>227</td>
<td>44.30</td>
</tr>
<tr>
<td>I never used one or had one used</td>
<td>219</td>
<td>42.80</td>
</tr>
<tr>
<td><strong>n = 328</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Percentages do not total 100 due to multiple response

Availability of Computers to Managers

<table>
<thead>
<tr>
<th>Availability of Computers to Managers</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Got one at home</td>
<td>81</td>
<td>24.70</td>
</tr>
<tr>
<td>Got one in my office</td>
<td>69</td>
<td>21.04</td>
</tr>
<tr>
<td>There is one available to me at work</td>
<td>75</td>
<td>22.87</td>
</tr>
<tr>
<td>I use the reports from a computer in my job</td>
<td>142</td>
<td>43.29</td>
</tr>
<tr>
<td>My colleagues use them</td>
<td>89</td>
<td>27.13</td>
</tr>
<tr>
<td>I rarely come across them</td>
<td>82</td>
<td>25.00</td>
</tr>
<tr>
<td><strong>n = 328</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Percentages do not total 100 due to multiple response
2.4 Monitoring and Development of Information Technology

In summarising their findings, which included organisations with a total turnover of £72 billion, employing almost 2.7 million people, Heidrick and Struggles observe that,

"this survey has identified that major corporations have a fairly typical approach to information technology [IT] which can be simply described as 'largely haphazard', although the largest companies are clearly taking the most disciplined approach to the introduction of IT." (15)

Thus they note that while 47% of organisations overall have an information technology (IT) strategy that covers data processing, office systems and communications (which are administrative areas also of interest to hospitality organisations), 68% of service organisations are likely to have developed one. However, "few of these have Board approval", (no figure given) and only 10% of organisations overall have comprehensive new technology strategies.

A more recent study carried out by Market Opinion and Research International (MORI) on behalf of PA Management Consultants in 1985 (17) tends to confirm that the position has changed little. The PA study was intended as a qualitative comparison of international attitudes. The total international sample size is small. The British set of 34 companies is taken from the industrial sector, computers, domestic appliances, medical equipment, machine tools and chemicals. The companies in the survey were generally large, with a minimum turnover in the UK sample of £1.5m. Personal interviews were conducted with managing directors or chief executives.

In the PA study, only 3% of British companies had a board member responsible for informing the board about the potential impact of IT. 32% of British companies expected boards to inform themselves by direct observation or from other literature. Between the USA, UK, West Germany, Benelux and Japan, only the latter appeared to have a substantial proportion of companies with formal monitoring mechanisms for IT at board level.
From table 21 it can be seen that just over one fifth of hospitality managers in the survey, 21%, were not sure that IT would actually help them in their work. Heidrick and Struggles reported that 58% of companies conducted systematic awareness briefings for managers though this rises to 94% in service companies. In the hospitality industry it appears that only 10% of companies have formal mechanisms of this sort. However, most scanning is of the passive type, by reading of journals. Over a quarter of managers in hospitality, 27%, do no scanning at all. Less than one fifth, 18%, systematically monitor competing organisations. In commenting on a proportion almost twice as large elsewhere, Heidrick and Struggles observed that because only 33% of organisations in their sample followed such a programme this deprived them of opportunities to bring concerted pressure on suppliers and increased the likelihood of their having to redevelop systems in the future.
### TABLE 22

Monitoring of Information Technology (IT)

<table>
<thead>
<tr>
<th>IT will help with my job</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>247</td>
<td>77.19</td>
</tr>
<tr>
<td>No</td>
<td>6</td>
<td>1.88</td>
</tr>
<tr>
<td>Not sure yet</td>
<td>67</td>
<td>20.94</td>
</tr>
<tr>
<td>n = 320</td>
<td>320</td>
<td>100.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IT monitoring activities</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitor trade press for IT</td>
<td>133</td>
<td>40.55</td>
</tr>
<tr>
<td>Monitor business journals for IT</td>
<td>134</td>
<td>40.85</td>
</tr>
<tr>
<td>Attend regular company briefings</td>
<td>33</td>
<td>10.06</td>
</tr>
<tr>
<td>Attend major conferences on IT</td>
<td>25</td>
<td>7.62</td>
</tr>
<tr>
<td>Attend short courses to improve familiarity</td>
<td>81</td>
<td>24.70</td>
</tr>
<tr>
<td>Systematically check other organs. for IT</td>
<td>58</td>
<td>17.68</td>
</tr>
<tr>
<td>Regularly talk to colleagues about IT</td>
<td>137</td>
<td>41.77</td>
</tr>
<tr>
<td>None of these (no scanning activities)</td>
<td>87</td>
<td>26.52</td>
</tr>
<tr>
<td>n = 328</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Percentages do not total 100 due to multiple response

### FIGURE 22

IT Monitoring Activities

- No scanning
- Colleagues
- Other organisations
- Short courses
- Conferences
- Company briefings
- Business journals
- Trade press

n = 328
Figure 22 summarises monitoring activities in the hospitality industry. It appears that whilst formal monitoring mechanisms are low in all British industries they are at an exceptionally low level in catering and hotels. Low levels of monitoring, coupled with little formal training may be contributory factors to low rates of innovation.

Other studies have suggested that apparent management resistance to innovation in the UK may be a function of management education, training and development. For example, in 1977 Swords-Isherwood and Senker (18) reported on management resistance to the introduction of numerically controlled machine tools. Using depth interviews to compare six British and six German companies they attributed a reluctance to introduce new technology to an unwillingness by British managers to accept greater responsibility. They also suggested that technical graduates from British universities need longer practical training than their German counterparts.

Heidrick and Struggles note similar management caution. Whilst the 45% of the managers in their survey expect resistance from trade unions, 43% expect resistance from top management and 45% from middle management. Unions aroused little specific comment whereas middle management was seen as the key obstacle.

"Middle management is seen as attempting to maintain the traditional boundaries, in particular between DP and Office Services, resisting decentralisation, adopting 'old soldier' attitudes." (19)

The findings seem consistent with those of the PA survey in 1985. None of the British respondents mentioned trade unions as a source of constraint on innovation. Mostly this was attributed to lack of qualified staff, 41% and low growth or demand, 24%. Government regulations and interest rates were also mentioned. 65% of British respondents thought that universities should concentrate more on applied and less on fundamental research. Interestingly, only the German respondents in the PA survey suggested that trade union resistance was a significant constraint, at 8% of replies.

Swords-Isherwood and Senker also reported that worker resistance was of
little significance in impeding innovation in their study, though they did observe some sabotage by workers in one German company. They contend that through lack of proper research and planning, the potential impact of new technology on machine tool workers was not understood by management. This corresponds to the findings of the Labour Research Department Survey of 1982, described in chapter 4 (20). Here it was reported that workers did not always associate new technology with boredom and deskillling and that this in fact occurred in a minority of instances. In some cases it would appear that potential union resistance is offered as a convenient rationalisation by management.

There appears to be some broad evidence to support the view that management attitudes are a major constraint on the introduction of information technology and innovation. This may be attributable to limitations in formal education and the lack of appropriate self development. There is some evidence to suggest that such problems are excacerbated in the hospitality industry with its low proportion of graduate managers and very low levels of formal scanning. However, this difference is one of degree and is not a difference in kind from that of other industries.

3 Computer Applications in Hospitality and User Satisfaction

3.1 Computer Based Applications in Hotel and Catering

In chapter 4 it was argued that jobless growth in the hospitality sector was facilitated by applications of computers and microprocessors at the clerical level. Table 23 examines the main areas of application of computers in the survey.

In terms of the range of jobs to which computers could be applied it will be observed that the weight of applications is greatest at the clerical, data processing level. Figure 23 provides a list ranked by levels of penetration. It will be noted that accounting and finance applications predominate. Thus almost half of all respondents, 47%, use computerised billing and those applications employed by one fifth of respondents or more include all types of ledger accounts, payroll and budgeting. The second major area in this high usage group are inventory applications.
Either inventories of sales in the form of reservations or inventories of raw materials in the form of stock control and inventory.

On considering intentions to use and possible future applications survey respondents seem to promise 'more of the same' with particularly large increases intended in the area of food cost control, inventory and purchasing. Beverage cost control, budgeting, management accounting and personnel administration are also procedures where further large increases in applications are expected.

Almost all these areas of application are substantially concerned with manipulating data which are generated primarily within the organisation. However, two exceptions seem to present themselves. The first of these is sales forecasting and the second sales planning and control. It is well known that revenue increases are critical to changed performance in high fixed cost organisations. While cost control is symptomatic of prudent management, changes in profit multipliers are significantly larger for revenue changes than for cost changes in hotel and catering organisations. A concern with the custodial aspects of data processing, as evidenced by the emphasis of applications demonstrated by figure 23, can be taken as symptomatic of a product rather than a market orientation. It is noticeable from the emphasis of current applications that types of usage are characteristic of organisations with a greater interest in the mechanics of administration at a level that serves operational decisions primarily. Benefits for tactical or strategic decisions from this approach would be incidental.
### TABLE 23

Application Areas of Computer Based Procedures in Hotel and Catering Organisations in the UK - 1984

<table>
<thead>
<tr>
<th>APPLICATION</th>
<th>Computerised</th>
<th>Intend Poss.</th>
<th>PERCENT</th>
<th>n =</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FRONT OF HOUSE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reservations</td>
<td>22</td>
<td>35</td>
<td>13</td>
<td>32.4</td>
</tr>
<tr>
<td>Registration</td>
<td>22</td>
<td>21</td>
<td>16</td>
<td>32.4</td>
</tr>
<tr>
<td>Billing</td>
<td>32</td>
<td>42</td>
<td>11</td>
<td>47.1</td>
</tr>
<tr>
<td>Other</td>
<td>14</td>
<td>2</td>
<td>2</td>
<td>20.6</td>
</tr>
<tr>
<td><strong>FOOD &amp; BEVERAGE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stock taking</td>
<td>40</td>
<td>73</td>
<td>17</td>
<td>19.3</td>
</tr>
<tr>
<td>Inventory</td>
<td>36</td>
<td>81</td>
<td>20</td>
<td>17.4</td>
</tr>
<tr>
<td>Food Cost control</td>
<td>62</td>
<td>101</td>
<td>18</td>
<td>30.0</td>
</tr>
<tr>
<td>Beverage cost control</td>
<td>44</td>
<td>79</td>
<td>19</td>
<td>21.3</td>
</tr>
<tr>
<td>Sales Orders</td>
<td>30</td>
<td>50</td>
<td>27</td>
<td>14.5</td>
</tr>
<tr>
<td>Other</td>
<td>22</td>
<td>3</td>
<td>3</td>
<td>10.6</td>
</tr>
<tr>
<td><strong>ACCOUNTING</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounts receivable</td>
<td>68</td>
<td>67</td>
<td>14</td>
<td>24.2</td>
</tr>
<tr>
<td>Accounts payable</td>
<td>79</td>
<td>64</td>
<td>11</td>
<td>28.1</td>
</tr>
<tr>
<td>Nominal ledger</td>
<td>64</td>
<td>56</td>
<td>13</td>
<td>22.8</td>
</tr>
<tr>
<td>Payroll</td>
<td>98</td>
<td>38</td>
<td>15</td>
<td>34.9</td>
</tr>
<tr>
<td>Credit control</td>
<td>55</td>
<td>49</td>
<td>17</td>
<td>19.6</td>
</tr>
<tr>
<td>Other</td>
<td>24</td>
<td>2</td>
<td>2</td>
<td>8.5</td>
</tr>
<tr>
<td><strong>SALES &amp; MARKETING</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guest History - rooms</td>
<td>10</td>
<td>28</td>
<td>25</td>
<td>14.7</td>
</tr>
<tr>
<td>Guest History - banquets</td>
<td>2</td>
<td>25</td>
<td>28</td>
<td>1.1</td>
</tr>
<tr>
<td>Mailing lists</td>
<td>28</td>
<td>42</td>
<td>20</td>
<td>10.0</td>
</tr>
<tr>
<td>Sales planning/control</td>
<td>15</td>
<td>41</td>
<td>20</td>
<td>5.3</td>
</tr>
<tr>
<td>Media planning</td>
<td>6</td>
<td>17</td>
<td>23</td>
<td>2.1</td>
</tr>
<tr>
<td>Other</td>
<td>11</td>
<td>4</td>
<td>4</td>
<td>3.9</td>
</tr>
<tr>
<td><strong>GENERAL MANAGEMENT</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Budgeting</td>
<td>87</td>
<td>85</td>
<td>11</td>
<td>31.0</td>
</tr>
<tr>
<td>Sales forecasting</td>
<td>43</td>
<td>67</td>
<td>11</td>
<td>15.3</td>
</tr>
<tr>
<td>Management accounts</td>
<td>76</td>
<td>71</td>
<td>10</td>
<td>27.0</td>
</tr>
<tr>
<td>Maintenance co-ord</td>
<td>9</td>
<td>36</td>
<td>21</td>
<td>3.2</td>
</tr>
<tr>
<td>Housekeeping co-ord</td>
<td>7</td>
<td>29</td>
<td>25</td>
<td>2.5</td>
</tr>
<tr>
<td>Reports/letters</td>
<td>32</td>
<td>55</td>
<td>19</td>
<td>11.4</td>
</tr>
<tr>
<td>Project control</td>
<td>12</td>
<td>35</td>
<td>23</td>
<td>4.3</td>
</tr>
<tr>
<td>Personnel admin.</td>
<td>36</td>
<td>69</td>
<td>14</td>
<td>12.8</td>
</tr>
<tr>
<td>Purchasing</td>
<td>39</td>
<td>76</td>
<td>13</td>
<td>13.9</td>
</tr>
<tr>
<td>Other</td>
<td>21</td>
<td>3</td>
<td>3</td>
<td>7.5</td>
</tr>
</tbody>
</table>

(1) 68 = responses to Q1.2, main business of unit is hotel
(2) 207 = responses to Q1.4, business is food & beverage
(3) 281 = responses to Q1.2, less non-operational managers (other & education)
(4) 189 = as (3) less welfare catering
FIGURE 23

Percentage Penetration of Applications

Ranked in Order of Utilisation

- Guest History - banq
- Media planning
- Housekeeping co - ord
- Maintenance co - ord
- Project control
- Sales plan/control
- Mailing lists
- Reports/letters
- Personnel admin.
- Purchasing
- Sales Orders
- Guest History - room
- Sales forecasting
- Inventory
- Stock taking
- Credit control
- Barge. cost control
- Nominal ledger
- Accounts receivable
- Management accounts
- Accounts payable
- Food Cost control
- Budgeting
- Registration
- Reservations
- Payroll
- Billing

P.R. Gamble
Comparative data for hotel and catering computer applications are not widely available, only two other studies of a similar type have been carried out.

The first of these was conducted by the British Association of Hotel Accountants (BAHA) in 1980 (21). BAHA is a semi-professional association strongly influenced by an American owned data processing company which markets in the UK amongst other things, computer bureau services for financial administration and hotel systems based on small computers. Its work cannot be regarded as entirely impartial. The sample taken was obtained from a survey of 300 hotels to which 60 responses were received. The sample was biased in two ways. First, all BAHA members were exclusively included. Thus a disproportionate number of professional accountants were represented in the response. Second, only 5 replies were received from hotels with less than 25 rooms and 34 replies, 57% from hotels with 100 rooms or more. Results therefore over represent accounting applications and the small proportion of large hotels.

The second survey is statistically more sound and was carried out by Gallup Polls on behalf of the Caterer and Hotelkeeper Magazine (22). Only a small proportion of these results were published and the full table of results as provided to the magazine was kindly supplied directly by the deputy editor. Results were provided from 170 hotels in a response which reflects the structure of the industry in a more balanced way. However, the Gallup data will under represent food and beverage applications since it confines itself to the commercial accommodation sector. No standard deviations were provided but simple comparisons between the Gallup survey and the Gamble survey are of interest.

Table 24 summarises the comparisons between the present survey and the two other surveys for areas where comparative data are available. Figures are cited only as percentages and no conclusions can be drawn concerning the terminology which was employed. Thus "reservations" in the Gallup survey may subsume registration identified separately by Gamble. Food and beverage control and stocktaking were all grouped together by Gallup.

As might be expected, the BAHA survey shows a very high level of applications in accountancy areas, a result which must be treated with
caution. With this exception, the pattern of utilisation is consistent between the three surveys with some evidence of a slow rate of increase. Elsewhere, Gallup showed that 38% of users had acquired their first computer package in 1983 (the year of the survey) and a further 36% only one year earlier. Thus many of the hotels sampled had come to computers very recently.

Given the nature of the supply conditions, overall figures for market penetration are imprecise and of doubtful value. A small country hotel with few rooms but a large food and beverage operation may very well use a computer for room reservations if its primary justification has been achieved elsewhere. As indicated in chapter 5, clerical applications in hotel accommodation management are probably extensive in larger, commercial hotels. Even clerical applications are at a much lower level in all types of food and beverage application. With the exception of accounting, other areas such as marketing, personnel administration, banqueting and maintenance, reveal minimal usage of computers.
### TABLE 24

Comparative Percentage Levels of Computer Applications in UK Hotels

<table>
<thead>
<tr>
<th>Application</th>
<th>1984</th>
<th>1983</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FRONT OF HOUSE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reservations</td>
<td>32</td>
<td>22</td>
<td>32</td>
</tr>
<tr>
<td>Registration</td>
<td>32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Billing</td>
<td>47</td>
<td>22</td>
<td>37</td>
</tr>
<tr>
<td><strong>FOOD &amp; BEVERAGE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inventory</td>
<td>17</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Food Cost control</td>
<td>30</td>
<td>11</td>
<td>22</td>
</tr>
<tr>
<td><strong>ACCOUNTING</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounts receivable</td>
<td>24</td>
<td>4</td>
<td>45</td>
</tr>
<tr>
<td>Accounts payable</td>
<td>28</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Nominal ledger</td>
<td>23</td>
<td></td>
<td>40</td>
</tr>
<tr>
<td>Payroll</td>
<td>35</td>
<td>7</td>
<td>28</td>
</tr>
<tr>
<td><strong>SALES &amp; MARKETING</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guest History - rooms</td>
<td>15</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>GENERAL MANAGEMENT</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Budgeting</td>
<td>31</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Sales forecasting</td>
<td>15</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Management accounts</td>
<td>27</td>
<td></td>
<td>37</td>
</tr>
<tr>
<td>Reports/letters</td>
<td>11</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Project control</td>
<td>4</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

Gallup n = 170
BAHA n = 60

**Gallup Sample Frame**

<table>
<thead>
<tr>
<th>Number of beds (note: not rooms)</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;= 50</td>
<td>50</td>
</tr>
<tr>
<td>50 - 99</td>
<td>41</td>
</tr>
<tr>
<td>100 - 140</td>
<td>34</td>
</tr>
<tr>
<td>150 - 199</td>
<td>10</td>
</tr>
<tr>
<td>&gt;= 200</td>
<td>34</td>
</tr>
</tbody>
</table>

170

**BAHA Sample Frame**

<table>
<thead>
<tr>
<th>Number of rooms</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;= 25</td>
<td>5</td>
</tr>
<tr>
<td>26 - 50</td>
<td>7</td>
</tr>
<tr>
<td>51 - 100</td>
<td>14</td>
</tr>
<tr>
<td>&gt;= 101</td>
<td>34</td>
</tr>
</tbody>
</table>

60

P.R. Gamble
3.2 Microprocessor Based Applications in Hotel and Catering

Table 25 describes microprocessor based applications in the hospitality industry. Since the role of the microprocessor in these devices is often obscured by the primary function of the machine in which it is embedded, these have been separated from computer based applications.

As might be predicted, by far and away the most common application is that of point of sale systems in which the microprocessor drives an electronic cash register (ECR). Almost 60% of respondents possessed ECRs, although only a small proportion used these in a sophisticated way linked in a network. At about half this level of usage, were electronic alarm systems at just under 32% of respondents.

The only other applications which were relatively widespread were electronic wake up systems and telephone systems at 18% and 16% respectively.

The slow rate of innovation that might be represented by reinvestment is reflected in two areas especially. Room status systems, where installed are predominantly operated as stand alone systems as opposed to being integrated into other applications. Since the cabling cost of a separate system for room status is high, this unsophisticated approach clearly carries a direct penalty. In the vending area, the most common application is that of beverage vending, well established for many years and not dependent for its technology on microelectronics.

The low level of utilisation in areas of heating, ventilation and airconditioning (HVAC) is surprising. Whilst it is difficult to evaluate revenue gains in accommodation, food and beverage sales since an element of opportunity cost is involved, this problem does not apply to energy costs. Almost all organisations can account for and track changes in energy costs through their normal accounting record systems. It was anticipated that recent concerns with energy expenditure coupled with easily identifiable rates of return associated with investments in this area would have led to higher installation rates.

The survey data seem to show that levels of innovation are consistently
low, even where perceptions are not directly influenced by the presence of computers.
### TABLE 25

**Microprocessor Based Applications in the Hotel and Catering Industry**

<table>
<thead>
<tr>
<th>Application</th>
<th>f</th>
<th>%</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stand alone Electronic Cash Register</td>
<td>169</td>
<td>54.9</td>
<td>308</td>
</tr>
<tr>
<td>Electronic Cash Registers - networked</td>
<td>15</td>
<td>4.9</td>
<td>308</td>
</tr>
<tr>
<td>Electronic door locking systems</td>
<td>9</td>
<td>2.9</td>
<td>308</td>
</tr>
<tr>
<td>Electronic alarm systems (smoke/fire)</td>
<td>97</td>
<td>31.5</td>
<td>308</td>
</tr>
<tr>
<td>Computer controlled telephone system</td>
<td>49</td>
<td>15.9</td>
<td>308</td>
</tr>
<tr>
<td>Room status system - stand alone</td>
<td>6</td>
<td>8.8</td>
<td>68</td>
</tr>
<tr>
<td>Room status system - linked to security system</td>
<td>1</td>
<td>1.5</td>
<td>68</td>
</tr>
<tr>
<td>Room status system - linked to TV system</td>
<td>1</td>
<td>1.5</td>
<td>68</td>
</tr>
<tr>
<td>Room status system - linked to telephone system</td>
<td>3</td>
<td>4.4</td>
<td>68</td>
</tr>
<tr>
<td>Automatic wake up system</td>
<td>12</td>
<td>17.6</td>
<td>68</td>
</tr>
<tr>
<td>Teletex system in guest rooms</td>
<td>2</td>
<td>2.9</td>
<td>68</td>
</tr>
<tr>
<td>Own in-house entertainment system+</td>
<td>25</td>
<td>8.1</td>
<td>308</td>
</tr>
<tr>
<td>Microcomputers for guest hire</td>
<td>2</td>
<td>2.9</td>
<td>68</td>
</tr>
<tr>
<td>Computer monitored vending - beverages only</td>
<td>18</td>
<td>5.8</td>
<td>308</td>
</tr>
<tr>
<td>Computer monitored vending - food only</td>
<td>3</td>
<td>1.0</td>
<td>308</td>
</tr>
<tr>
<td>Computer monitored vending - food &amp; beverages</td>
<td>7</td>
<td>2.3</td>
<td>308</td>
</tr>
<tr>
<td>Computer monitored vending - in room entertainment</td>
<td>1</td>
<td>.3</td>
<td>308</td>
</tr>
<tr>
<td>Microprocessor controlled - main boilers</td>
<td>14</td>
<td>4.5</td>
<td>308</td>
</tr>
<tr>
<td>Microprocessor controlled - heating &amp; ventilation</td>
<td>17</td>
<td>5.5</td>
<td>308</td>
</tr>
<tr>
<td>Microprocessor controlled - lighting</td>
<td>2</td>
<td>.6</td>
<td>308</td>
</tr>
<tr>
<td>Microprocessor controlled - air conditioning</td>
<td>7</td>
<td>2.3</td>
<td>308</td>
</tr>
<tr>
<td>Microprocessor controlled - kitchen equipment</td>
<td>6</td>
<td>1.9</td>
<td>308</td>
</tr>
</tbody>
</table>

308 = all responses less category education/consultant in Q1.2
+ includes hospital radio
3.3 Investment in Computer Hardware and Software

The Gallup survey did not investigate investment but in 1980 the BAHA survey estimated the average direct annual expenditure of each hotel or group of hotels in their survey at £76,000. By 1984, the Gamble survey revealed an average direct expenditure £24,018, less than one third of the 1980 figure in money terms. In real values, allowing for the effects of inflation the drop is considerably greater. The retail price index rose by 25.06% during this period (23) so that the 1984 spend was 25.28% of the 1980 level. Once again, direct comparisons cannot be made with confidence. The figure of £24,018 is drawn from tables 26 and 27 and totals the mean annual expenditures for hardware and software investment and the mean annual expenditures on hardware and software maintenance. It is not clear if the BAHA includes both hardware and software or if it includes maintenance.

Table 26 describes the investments in hardware made by hotel and catering organisations. The modal value of current hardware investment is between £800 and £5,000 which reflects the importance of microcomputer systems to the industry. Annual hardware budgets are generally small, at about the same level as current investment values though it is interesting that only a quarter of those with a hardware investment actually responded to the question on the size of budget. This is suggestive of a situation in which purchases are made on an intermittent rather than a planned, regular basis. A surprisingly large figure is expended for hardware maintenance, being roughly equivalent to half the annual purchase value.

Similarly, table 27 shows that software is beginning to dominate purchasing budgets. In 1984, the total investment in software stood at approximately 51% of the investment in hardware. However, these proportions seem set to alter. Annual allocations for software at £8,705 are larger than the average value of current holdings at £7,405. There were more responses to the question relating to annual software budgets which is suggestive of a higher level of awareness. It is noticeable also that this is a binodal distribution. Whilst 48% of respondents fell in the under £5,000 per annum category a further 48% estimated annual software expenditures at over £10,000. Software maintenance budgets seem to be generally small. A very small proportion of respondents replied to
this question and the average value of expenditure was only £1,767.
TABLE 26
Investments in Hardware in the UK Hotel and Catering Industry 1984

**TOTAL Current Investment in Hardware**

<table>
<thead>
<tr>
<th>Hardware £00s</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 - 7</td>
<td>2</td>
</tr>
<tr>
<td>8 - 50</td>
<td>33</td>
</tr>
<tr>
<td>51 - 100</td>
<td>19</td>
</tr>
<tr>
<td>101 - 150</td>
<td>7</td>
</tr>
<tr>
<td>151 - 200</td>
<td>2</td>
</tr>
<tr>
<td>&gt;= 201</td>
<td>19</td>
</tr>
</tbody>
</table>

Mean = £10,205  
S.D. = £7,485

**ANNUAL Hardware Investment £00s**

<table>
<thead>
<tr>
<th>Hardware £00s</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 - 7</td>
<td>1</td>
</tr>
<tr>
<td>8 - 50</td>
<td>12</td>
</tr>
<tr>
<td>51 - 100</td>
<td>1</td>
</tr>
<tr>
<td>101 - 150</td>
<td>1</td>
</tr>
<tr>
<td>151 - 200</td>
<td>1</td>
</tr>
<tr>
<td>&gt;= 201</td>
<td>5</td>
</tr>
</tbody>
</table>

Mean = £9,421  
S.D. = £9,464

**Annual Hardware MAINTENANCE £00s**

<table>
<thead>
<tr>
<th>Hardware £00s</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 3</td>
<td>5</td>
</tr>
<tr>
<td>4 - 7</td>
<td>9</td>
</tr>
<tr>
<td>8 - 50</td>
<td>12</td>
</tr>
<tr>
<td>51 - 100</td>
<td>1</td>
</tr>
<tr>
<td>101 - 150</td>
<td>2</td>
</tr>
<tr>
<td>151 - 200</td>
<td>1</td>
</tr>
<tr>
<td>&gt;= 201</td>
<td>1</td>
</tr>
</tbody>
</table>

Mean = £4,125  
S.D. = £5,900
### TABLE 27

**Investments in Software in the UK Hotel and Catering Industry 1984**

**TOTAL Current Investment in Software**

<table>
<thead>
<tr>
<th>Software £00s</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 3</td>
<td>4</td>
</tr>
<tr>
<td>4 - 7</td>
<td>7</td>
</tr>
<tr>
<td>8 - 50</td>
<td>30</td>
</tr>
<tr>
<td>51 - 100</td>
<td>4</td>
</tr>
<tr>
<td>101 - 150</td>
<td>2</td>
</tr>
<tr>
<td>151 - 200</td>
<td>1</td>
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<tr>
<td>201 - 250</td>
<td>1</td>
</tr>
<tr>
<td>&gt;= 251</td>
<td>8</td>
</tr>
</tbody>
</table>

Mean = £7,485  
S.D. = £9,922

**ANNUAL Software Investment £00s**

<table>
<thead>
<tr>
<th>Software £00s</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 - 7</td>
<td>9</td>
</tr>
<tr>
<td>8 - 50</td>
<td>6</td>
</tr>
<tr>
<td>51 - 100</td>
<td>1</td>
</tr>
<tr>
<td>101 - 150</td>
<td>9</td>
</tr>
<tr>
<td>151 - 200</td>
<td>3</td>
</tr>
<tr>
<td>&gt;= 201</td>
<td>3</td>
</tr>
</tbody>
</table>

Mean = £8,705  
S.D. = £7,952

**Annual Software MAINTENANCE £00s**

<table>
<thead>
<tr>
<th>Software £00s</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 3</td>
<td>5</td>
</tr>
<tr>
<td>4 - 7</td>
<td>2</td>
</tr>
<tr>
<td>8 - 50</td>
<td>6</td>
</tr>
<tr>
<td>51 - 100</td>
<td>3</td>
</tr>
<tr>
<td>101 - 200</td>
<td>1</td>
</tr>
</tbody>
</table>

Mean = £1,767  
S.D. = £3,910
3.31 Type of Hardware and Software

The importance of microcomputer systems is also illustrated by the analysis in table 28. Just over 30% of all respondents already have 1 or more microcomputers in their department. Indeed, 41% of those with microcomputers in their department have more than one machine. Only 7% of respondents were in departments which had access to a minicomputer.

Whilst the modal number of microcomputers is 1, the mean is just over 2 machines per department. One third of all respondents, 33%, have access to a VDU and just under one third access to a printer. Responses in this section of the survey seem to suggest that multi user systems, in either hotels or catering units are of greater interest with an average of nearly 3 VDUs and 2 printers per department.

In 1980, BAMA found that the most common form of computer utilisation was through timeshared minicomputers. 52% of their respondents had access to an in-house minicomputer and a further 29% had access to a timesharing bureau. Only 19% of users were employing microcomputers and the survey report commented, "this indicates that the type and volume of work within hotels is too large for micros . . . ". It went on to conclude that "currently the industry believes that the majority of its computing can be processed in a batch mode." (24) Whilst such a conclusion may be tenable for accounting applications it is clearly invalid in so far as hotel operating systems such as reservations are concerned. The conclusion may not be unrelated to the attempts by ADP Ltd. to market bureau services at that time.

Miscellaneous other types of equipment that were mentioned by one or two users included mini terminals (an abbreviated keyboard, remote data entry pad supplied with Hoskyns hotel systems), card readers, and other data entry devices. No mention was made of facsimile transmission though 1 user claimed access to a "videogate", presumably a link into the Prestel teletex system.
<table>
<thead>
<tr>
<th>Type of Computer</th>
<th>Minicomputers</th>
<th>Number of Computers</th>
<th>Mean</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td></td>
<td></td>
<td></td>
</tr>
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<tr>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td><strong>25</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of Computer</th>
<th>Microcomputers</th>
<th>Number of Computers</th>
<th>Mean</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td></td>
<td></td>
<td></td>
</tr>
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<tr>
<td>2</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>2</td>
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<td></td>
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</tr>
<tr>
<td>&gt;= 6</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>99</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of VDU</th>
<th>VDUs</th>
<th>Number of Computers</th>
<th>Mean</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>51</td>
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<tr>
<td>2</td>
<td>26</td>
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<td>3</td>
<td>11</td>
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<td>6</td>
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<tr>
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<tr>
<td>&gt;= 8</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>110</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of Printer</th>
<th>Printers</th>
<th>Number of Computers</th>
<th>Mean</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>57</td>
<td></td>
<td></td>
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<td>2</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;= 7</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>107</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The current survey, four years after the BAHA report reveals the effect of changes in the power and price performance of small computers. Figure 24 shows that just under half of all respondents making use of computers, 49%, do so principally by means of their own dedicated system. Overall, timeshared applications have fallen to 33% of principal forms of use and bureaux are down to 6% of applications.

In business microcomputing, three main application packages are commonly associated with the use of small computers. These correspond to the main fields of administrative activity, word processing for text manipulation, database management for file handling and spreadsheets for numerical calculation. For those with the use of a microcomputer at work, the most commonly available package to hotel and catering management departments is that of word processing. Figure 25 shows that 70% of microcomputer systems are used for this application. Database management is used by 40% and financial planning and spreadsheets on 37% and 33% of systems respectively.

The predominance of the secretarial activities of typing and filing is suggestive of the orientation which is taken when installing these machines. In the survey overall, just under 10% of respondents are using microcomputers for some type of financial planning, an activity more likely to be the province of managers. Nevertheless these results are very different from those obtained by Gallup only one year earlier. Gallup found that only 13% of users were employing a computer for word processing, though a further 15% intended to do so. Only 2% were using a computer for forecasting, though a further 5% intended to use the machine for hotel finances.

It may be noted that the Gamble survey includes the important institutional catering sector of the industry whereas the two earlier surveys did not. Some differences in utilisation may be attributed to the changes in price performance ratio of small computers. However, it seems likely that institutional caterers make more widespread use of computers, in both general and specialist applications than do their counterparts in the hotel industry.
FIGURE 24
Main Method of Computer Usage

49%

- Own dedicated system: 15%
- Timeshare – in house: 10%
- Timeshare – company: 4%
- Batch: 2%
- Bureau – regular: 1%
- Bureau – occasional: 1%
- Other: 18%
FIGURE 25
Usage of Business Application Programs

Use of a micro at work \((n = 84)\)

<table>
<thead>
<tr>
<th>Package</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word processor</td>
<td>70</td>
</tr>
<tr>
<td>Database manager</td>
<td>40</td>
</tr>
<tr>
<td>Financial planner</td>
<td>37</td>
</tr>
<tr>
<td>Spreadsheet</td>
<td>33</td>
</tr>
<tr>
<td>Other</td>
<td>37</td>
</tr>
</tbody>
</table>
3.4 Impressions of Service from the Computer Industry

Question 7 of the Gamble survey used a Likert scale to ask users to rate their impressions of service from the computer industry on a range of 20 features covering hardware, software, installation, training and reliability. Respondents were asked to rate each factor on a seven point scale which ranged from excellent to abysmal. The seven point scale was selected so as to be consistent with the scales used for attitudinal assessment in questions 15 and 16.

Results were analysed by assigning a score of 7 to responses described as excellent, 4 as neutral and 1 as abysmal. Thus a mean response of 4 may be represented as indifference to the item while values approaching either extreme, 7 or 1 may be taken as indicative of the strength of feeling either negatively or positively towards that particular issue. Table 29 summarises the main findings. It will be observed that approximately one third of respondents answered this section of the questionnaire.

The percentage rating in the right hand column provides a relative measure of the extent to which a given feature satisfies the needs of hospitality managers. A mean score of 7, in which all respondents rated the item as excellent, would lead to a percentage score of 100%. In order to assist interpretation of the results further, data were re-ordered to produce figure 26. In this figure, the indifference score of 4 was deducted from each mean so that negative and positive responses could be more easily separated. Thus a score of +3 represents excellent and -3 abysmal. Data were then sorted. From this analysis, four elements can be identified.

a) There are no extremely positive responses in which a majority of users rate a feature as very good or better. Four areas achieve strongly positive responses, reliability of VDUs and computers, value for money of hardware, hardware meets specifications and reliability of printers. These are all features unrelated to the specific application areas of hotel and catering and focus on areas which derive from the manufacturer rather than on the efforts of systems houses to provide industry specific applications software.

b) In the majority of areas, the performance of system suppliers is
considered acceptable without being regarded in a strong positive sense.

c) In three areas, the performance of the computer industry is perceived as more or less indifferent. These are, easy to understand documentation, speed of fixing software faults and the cost of hardware maintenance. Hospitality managers clearly see these as only marginally acceptable.

d) Training from suppliers and dealers is on the whole unsatisfactory. Thus whilst systems that are supplied are seen as quite user friendly, fault tolerant and moderately supportive, supplier training is an area that needs definite improvement.
### TABLE 29

Impressions of the Computer Industry by Hotel and Catering Managers

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>Mean</th>
<th>S.D.</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HARDWARE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value for money hardware</td>
<td>5.045</td>
<td>1.086</td>
<td>111</td>
<td>72.07</td>
</tr>
<tr>
<td>Reliability of computers</td>
<td>5.221</td>
<td>1.124</td>
<td>113</td>
<td>74.59</td>
</tr>
<tr>
<td>Reliability of VDUs</td>
<td>5.636</td>
<td>.955</td>
<td>110</td>
<td>80.51</td>
</tr>
<tr>
<td>Reliability of printers</td>
<td>4.955</td>
<td>1.248</td>
<td>112</td>
<td>70.79</td>
</tr>
<tr>
<td>Hardware performs to spec.</td>
<td>5.027</td>
<td>.986</td>
<td>111</td>
<td>71.81</td>
</tr>
<tr>
<td><strong>SOFTWARE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value for money software</td>
<td>4.627</td>
<td>1.255</td>
<td>110</td>
<td>66.10</td>
</tr>
<tr>
<td>Software meets expectations</td>
<td>4.513</td>
<td>1.350</td>
<td>113</td>
<td>64.47</td>
</tr>
<tr>
<td>Software meets personal needs</td>
<td>4.438</td>
<td>1.432</td>
<td>112</td>
<td>63.40</td>
</tr>
<tr>
<td>Ease for changing software</td>
<td>4.257</td>
<td>1.336</td>
<td>109</td>
<td>60.81</td>
</tr>
<tr>
<td>Training from supplier/dealers</td>
<td>3.752</td>
<td>1.409</td>
<td>109</td>
<td>53.60</td>
</tr>
<tr>
<td><strong>INSTALLATION &amp; MAINTENANCE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost of hardware maintenance</td>
<td>4.072</td>
<td>1.033</td>
<td>97</td>
<td>58.17</td>
</tr>
<tr>
<td>Speed of hardware maintenance</td>
<td>4.360</td>
<td>1.087</td>
<td>100</td>
<td>62.29</td>
</tr>
<tr>
<td>Cost of software maintenance</td>
<td>4.200</td>
<td>.962</td>
<td>93</td>
<td>60.00</td>
</tr>
<tr>
<td>Speed of fixing software fault</td>
<td>4.088</td>
<td>1.259</td>
<td>102</td>
<td>58.40</td>
</tr>
<tr>
<td>Prompt delivery and installation</td>
<td>4.639</td>
<td>1.294</td>
<td>101</td>
<td>66.27</td>
</tr>
<tr>
<td><strong>INSTALLATION &amp; TRAINING</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Documentation easy understand</td>
<td>4.091</td>
<td>1.437</td>
<td>110</td>
<td>58.44</td>
</tr>
<tr>
<td>Documentation well indexed</td>
<td>4.266</td>
<td>1.412</td>
<td>109</td>
<td>60.94</td>
</tr>
<tr>
<td>Systems &quot;friendly&quot; to users</td>
<td>4.703</td>
<td>1.240</td>
<td>111</td>
<td>67.19</td>
</tr>
<tr>
<td>Systems provide help if need</td>
<td>4.618</td>
<td>1.181</td>
<td>110</td>
<td>65.97</td>
</tr>
<tr>
<td>Systems tolerate op. errors</td>
<td>4.432</td>
<td>1.312</td>
<td>111</td>
<td>63.31</td>
</tr>
</tbody>
</table>

A score of 7 = excellent, 4 = neutral, 1 = abysmal
FIGURE 26

Service from the Computer Industry

Suppliers' training
Cost hardware maint
Speed fix software
Understand manual
Cost of software maint
Software changes
Manual well indexed
Rapid hardware maint
Tolerates errors
Software meets needs
Software meets expns
On-line help good
Value for £ software
Prompt delivery
User friendly
Reliability printers
Hardware meets spec.
Value for £ hardware
Reliability computers
Reliability VDUs

[VERY POOR] -2 -1 0 1 2 [VERY GOOD]

Range is -3 (abysmal) to +3 (excellent)

Net Weight

P.R. Gamble
On balance, the attitudes of hospitality managers are not especially favourable to the applications software and support that is provided by their direct contacts with computer system suppliers. Most favourable impressions are being created by the hardware.

In 1983 the Gallup survey also tried to provide an assessment of satisfaction levels. The question which they used is a classic example of poor phraseology for work of this type. "Overall, how satisfied are you with the package?" Such a choice of words is notoriously inept for assessing complex issues. The respondent being asked to make a single, overall assessment of a situation that has many dimensions. No great credence can be given to this aspect of the Gallup report due to the nature of the questions used. Nevertheless, on a scale of 1 to 4, Gallup reported 40% as very satisfied and 50% as quite satisfied. A weighting of these scores yields about 80% satisfaction with the packages in use.

The result may be compared with other responses that Gallup obtained. For example, 38% of respondents reported a computer failure once every three months and a further 23% once every 6 months. There is no indication as to whether this relates to hardware or software failures. Further analysis of the Gallup responses, given the weakness of this particular line of questioning, shows that training and the performance of the applications software are the major concerns of hotel users.

Thus in identifying areas where computer manufacturers (note, not software houses) could improve their packages for hotels, 27% of respondents wanted more tailor-made packages and 13% wanted better training. Curiously, "overall" levels of satisfaction with the training ran at about the same level, 80%, as ratings of the package as a whole only 1 user expressing themselves to be not satisfied at all.

3.5 Responsibility for Installation and Replacement of Computer Systems

In 1980, BAHAS found that 70% of 'computing solutions' were derived as a result of 'internal appraisal'. Other sources of influence were existing computer suppliers and user recommendations within the hotel industry. Only 27% of respondents made use of specialist consultants.
By 1984, the Gamble survey showed that this tendency to use internal resources had increased. Table 30 shows that in the vast majority of cases, managers are directly involved either alone or with immediate colleagues in both the decision to initiate a computer installation and the analysis of computing requirements. In less than one quarter of all instances is the decision initiated outside the unit, by a central office. These central resources are then used in less than one fifth of instances in analysing needs. Outside specialist consultants are now being employed in under 10% of cases. This change may be due to increased technical support available in larger organisations or to a lowering of the perceived complexity for decisions of this type.

7% of respondents, 24 in all, reported situations in which computers had been removed or replaced. In just under two thirds of these instances, 14 cases, systems had been substituted by alternatives, though two users reported reverting to manual systems. Seven users had obtained new systems from the same supplier. These may have been upgrades.
### TABLE 30

Responsibility for Initiating Installation and Recommending Requirements for Computer Based Systems in UK Hotel and Catering Units

<table>
<thead>
<tr>
<th>Initiator</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>I would</td>
<td>137</td>
<td>41.77%</td>
</tr>
<tr>
<td>Someone else in my department</td>
<td>13</td>
<td>3.96%</td>
</tr>
<tr>
<td>My boss</td>
<td>74</td>
<td>22.56%</td>
</tr>
<tr>
<td>Another department in my company</td>
<td>42</td>
<td>12.80%</td>
</tr>
<tr>
<td>Head Office</td>
<td>77</td>
<td>23.48%</td>
</tr>
<tr>
<td>Don't know</td>
<td>11</td>
<td>3.35%</td>
</tr>
</tbody>
</table>

n = 328
Percentages do not equal 100 due to multiple responses

<table>
<thead>
<tr>
<th>Analyst</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>I would</td>
<td>149</td>
<td>45.43%</td>
</tr>
<tr>
<td>Someone else in my department</td>
<td>28</td>
<td>8.54%</td>
</tr>
<tr>
<td>My boss</td>
<td>69</td>
<td>21.04%</td>
</tr>
<tr>
<td>Another department in my company</td>
<td>77</td>
<td>23.48%</td>
</tr>
<tr>
<td>Head Office</td>
<td>57</td>
<td>17.38%</td>
</tr>
<tr>
<td>An outside consultant</td>
<td>31</td>
<td>9.45%</td>
</tr>
<tr>
<td>Don't know</td>
<td>11</td>
<td>3.35%</td>
</tr>
</tbody>
</table>

n = 328
Percentages do not equal 100 due to multiple responses

Managers who have Removed or Replaced Computer Systems

<table>
<thead>
<tr>
<th>Replacement of a Computer System</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer from same supplier</td>
<td>7</td>
<td>29.17%</td>
</tr>
<tr>
<td>Computer from different supplier</td>
<td>14</td>
<td>58.33%</td>
</tr>
<tr>
<td>Manual system</td>
<td>2</td>
<td>8.33%</td>
</tr>
<tr>
<td>Can't recall/no decision</td>
<td>1</td>
<td>4.17%</td>
</tr>
</tbody>
</table>

n = 24
The central interest of the survey was to canvass attitudinal information on a broad basis in order to provide a perspective on the results obtained from cognitive mapping and from case studies.

As indicated in the introduction to this chapter, very few studies have been conducted amongst managers to elicit such data. However, a basis of comparison is available from a careful study carried out by Zoltan and Chapanis (25) from the John Hopkins University in 1980. This study investigated the attitudes of certified public accountants (CPAs), lawyers, pharmacists and physicians in the Baltimore City area of the USA. It was aimed at professionals because it was determined at the time that the computer industry was targeting its marketing at professional persons and the investigators wished to discover how acceptable these products were to their intended market.

The survey conducted by Gamble for this research sought to test a different proposition. Here, the question of interest is the extent to which the attitudes of hospitality managers might differ from those of other professional persons. Using Zoltan and Chapanis as the base line for this comparison poses some difficulties. The most obvious of these would be that of cultural difference. Attitudes between the two studies may vary not because of fundamental variations in perceptions of computers but because of differences in approaches to work, machines or management that may result from culture.

A further important change in circumstances which may affect results is the condition of the small computer market in 1980 and 1984. When the first study was carried out in 1980, small computers such as those likely to be used by independent professionals, were not available from companies with an established reputation in the business sector as a whole. This changed with the arrival of the IBM PC in 1981. The participation of IBM in the microcomputer market provided a major impetus to growth in the business sector. For managers who had formerly hesitated, this marked a watershed in that small computers could be purchased from a "respectable" company. In itself, IBM's participation may have contributed to an alteration in management attitudes during this period.
A third potential problem is that of respondent profile. In the American survey, respondents were predominantly male, 92%, and were slightly older than the British sample with a mean of 43.6 years. The educational level of the USA sample can certainly be reckoned to be higher than that of their British counterparts since the professions studied are not open to non-graduates.

To some extent the comparison is somewhat forced in the absence of other data though more recent British studies which touch on the same area will be cited. However, both groups involve individuals who may work in small businesses and who, with the exception of the CPAs, may be expected to assume a similar perspective on the use of computers. Both groups are in service occupations and deal primarily with problems that are not number based.

4.1 Hospitality Managers' General Attitudes to Computers

The general attitudes question consisted of 45 pairs of adjectives selected initially from an adjective checklist manual offered by Gough and Heilbrun (26). This was subsequently modified by Zoltan and Chapanis and supplemented by Gamble. The set used by Zoltan and Chapanis used 41 pairs of adjectives assembled in semantic differential format, four more sets were added both to take account of observations from the pilot studies and to balance the presentation. Thus for each pair of adjectives, respondents were asked to indicate the term that applied most descriptively to computers along the following lines.

Extremely Quite Slightly Neutral Slightly Quite Extremely

Stimulating  -----: -----: -----: -----: -----: -----: -----; Dull
Adaptable  -----: -----: -----: -----: -----: -----: -----; Unadaptable
Conventional  -----: -----: -----: -----: -----: -----: -----; Unusual

In order to avoid a within page bias to the left of the page, adjectives thought to denote positive attitudes were randomly placed to the left or the right. Data were analysed by scoring responses towards the left extreme as 7 and towards the right extreme as 1. Neutral replies were
scored 4. Preliminary results, sorted according to the mean scores are shown in Table 31. The percentage column indicates the degree to which a maximum score of 7 has been obtained. The weight column was derived by deducting the 'indifference factor' of 4 from each mean score. Figure 27 displays the result of this weighting graphically.

From these data it will be observed that hospitality managers would describe computers in mainly positive terms. The most strongly expressed adjectives, heavily emphasised are:

- systematic, precise, organized, efficient and fast.

These descriptions are consistent with the attitudes expressed in the interviews analysed in chapter three. They present a view of computers as important business tools. There is an organisational perspective which might be termed the utilitarian set.

The following set of adjectives are thought by managers to be quite descriptive of computers:

- desirable, effective, stimulating, challenging, adaptable,
  - reliable, enjoyable, dependable, helpful, trustworthy, pleasing,
  - encouraging, powerful, formal, predictable, clear, fun,
  - refreshing, co-operative.

These are all positive terms. They present a view of the computer as an interesting and useful device. This perspective is related to actual usage. It should be noted that the words, powerful, pleasing and helpful are included in this group as the opposite poles to weak, disgusting and hindering which were negatively scored.

They are followed by a third set, which is not so firmly expressed. It is interesting to note that this set introduces adjectives of an anthropomorphic character:

- flexible, intelligent, patient, adult, easy, demanding,
  - complicated, conventional, cold, friendly, affordable, dominant,
  - infallible, obedient, unthreatening.

The last two adjectives are the opposites of bossy and threatening which
were scored negatively. As a group, these words if attached to a human being could perhaps denote a figure along the lines of a Dickensian headmaster, somewhat distant and authoritarian. Some negative sentiments are included in this group such as complicated, cold, dominant and infallible.

The final group expresses human qualities most of all and these adjectives were all scored in a slightly negative way:

personalising, noisy, frustrating, forgiving, personal, humanising.

Thus the strongest orientation expressed is that of a machine which is primarily utilitarian but which managers are not averse to using. As a device, computers are not "humanised" by hospitality managers in the same way as some other machines such as boats or motor cars. Both positive and negative words are used to describe computers. Whilst on balance positive descriptors seem to dominate the perceptual framework, there is some evidence of concern amongst managers that the computer is an unforgiving, fairly implacable, inhuman assistant quite complex to understand.
### TABLE 31

General Attitudes to Computers by Hotel and Catering Managers

Sorted by Mean Response to Adjective Pairs

<table>
<thead>
<tr>
<th>ADJECTIVE</th>
<th>Mean</th>
<th>S.D.</th>
<th>n</th>
<th>%</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systematic</td>
<td>6.318</td>
<td>.921</td>
<td>261</td>
<td>90.26</td>
<td>2.32</td>
</tr>
<tr>
<td>Precise</td>
<td>6.266</td>
<td>1.039</td>
<td>259</td>
<td>89.51</td>
<td>2.27</td>
</tr>
<tr>
<td>Organized</td>
<td>6.115</td>
<td>1.033</td>
<td>262</td>
<td>87.36</td>
<td>2.12</td>
</tr>
<tr>
<td>Efficient</td>
<td>6.072</td>
<td>1.053</td>
<td>264</td>
<td>86.74</td>
<td>2.07</td>
</tr>
<tr>
<td>Fast</td>
<td>6.016</td>
<td>1.225</td>
<td>258</td>
<td>85.94</td>
<td>2.02</td>
</tr>
<tr>
<td>Desirable</td>
<td>5.947</td>
<td>1.190</td>
<td>263</td>
<td>84.96</td>
<td>1.95</td>
</tr>
<tr>
<td>Effective</td>
<td>5.907</td>
<td>1.113</td>
<td>259</td>
<td>84.39</td>
<td>1.91</td>
</tr>
<tr>
<td>Stimulating</td>
<td>5.848</td>
<td>1.323</td>
<td>276</td>
<td>83.54</td>
<td>1.85</td>
</tr>
<tr>
<td>Challenging</td>
<td>5.813</td>
<td>1.219</td>
<td>262</td>
<td>83.04</td>
<td>1.81</td>
</tr>
<tr>
<td>Adaptable</td>
<td>5.657</td>
<td>1.266</td>
<td>271</td>
<td>80.81</td>
<td>1.66</td>
</tr>
<tr>
<td>Reliable</td>
<td>5.491</td>
<td>1.353</td>
<td>267</td>
<td>78.44</td>
<td>1.49</td>
</tr>
<tr>
<td>Enjoyable</td>
<td>5.436</td>
<td>1.254</td>
<td>259</td>
<td>77.66</td>
<td>1.44</td>
</tr>
<tr>
<td>Dependable</td>
<td>5.433</td>
<td>1.373</td>
<td>261</td>
<td>77.61</td>
<td>1.43</td>
</tr>
<tr>
<td>Trustworthy</td>
<td>5.304</td>
<td>1.382</td>
<td>260</td>
<td>75.77</td>
<td>1.30</td>
</tr>
<tr>
<td>Encouraging</td>
<td>5.169</td>
<td>1.177</td>
<td>260</td>
<td>73.84</td>
<td>1.17</td>
</tr>
<tr>
<td>Formal</td>
<td>5.162</td>
<td>1.372</td>
<td>253</td>
<td>73.74</td>
<td>1.16</td>
</tr>
<tr>
<td>Predictable</td>
<td>5.142</td>
<td>1.327</td>
<td>261</td>
<td>73.46</td>
<td>1.14</td>
</tr>
<tr>
<td>Clear</td>
<td>5.128</td>
<td>1.469</td>
<td>257</td>
<td>73.26</td>
<td>1.13</td>
</tr>
<tr>
<td>Fun</td>
<td>5.110</td>
<td>1.422</td>
<td>263</td>
<td>73.00</td>
<td>1.11</td>
</tr>
<tr>
<td>Refreshing</td>
<td>5.081</td>
<td>1.134</td>
<td>260</td>
<td>72.59</td>
<td>1.08</td>
</tr>
<tr>
<td>Co-operative</td>
<td>5.004</td>
<td>1.393</td>
<td>250</td>
<td>71.49</td>
<td>1.00</td>
</tr>
<tr>
<td>Flexible</td>
<td>4.949</td>
<td>1.660</td>
<td>256</td>
<td>70.70</td>
<td>.95</td>
</tr>
<tr>
<td>Intelligent</td>
<td>4.786</td>
<td>1.745</td>
<td>257</td>
<td>68.37</td>
<td>.79</td>
</tr>
<tr>
<td>Patient</td>
<td>4.748</td>
<td>1.437</td>
<td>258</td>
<td>67.83</td>
<td>.75</td>
</tr>
<tr>
<td>Adult</td>
<td>4.688</td>
<td>1.260</td>
<td>253</td>
<td>66.97</td>
<td>.69</td>
</tr>
<tr>
<td>Easy</td>
<td>4.506</td>
<td>1.762</td>
<td>259</td>
<td>64.37</td>
<td>.51</td>
</tr>
<tr>
<td>Demanding</td>
<td>4.405</td>
<td>1.651</td>
<td>262</td>
<td>62.93</td>
<td>.41</td>
</tr>
<tr>
<td>Complicated</td>
<td>4.377</td>
<td>1.573</td>
<td>260</td>
<td>62.53</td>
<td>.38</td>
</tr>
<tr>
<td>Conventional</td>
<td>4.292</td>
<td>1.355</td>
<td>253</td>
<td>61.31</td>
<td>.29</td>
</tr>
<tr>
<td>Cold</td>
<td>4.291</td>
<td>1.337</td>
<td>254</td>
<td>61.30</td>
<td>.29</td>
</tr>
<tr>
<td>Friendly</td>
<td>4.268</td>
<td>1.420</td>
<td>257</td>
<td>60.97</td>
<td>.27</td>
</tr>
<tr>
<td>Affordable</td>
<td>4.248</td>
<td>1.939</td>
<td>258</td>
<td>60.69</td>
<td>.25</td>
</tr>
<tr>
<td>Dominant</td>
<td>4.125</td>
<td>1.237</td>
<td>257</td>
<td>58.93</td>
<td>.13</td>
</tr>
<tr>
<td>Infallible</td>
<td>4.100</td>
<td>1.552</td>
<td>259</td>
<td>58.57</td>
<td>.10</td>
</tr>
<tr>
<td>Personalising</td>
<td>3.726</td>
<td>1.481</td>
<td>259</td>
<td>53.23</td>
<td>-.27</td>
</tr>
<tr>
<td>Noisy</td>
<td>3.693</td>
<td>1.543</td>
<td>257</td>
<td>52.76</td>
<td>-.31</td>
</tr>
<tr>
<td>Frustrating</td>
<td>3.635</td>
<td>1.675</td>
<td>260</td>
<td>51.93</td>
<td>-.37</td>
</tr>
<tr>
<td>Forgiving</td>
<td>3.571</td>
<td>1.412</td>
<td>254</td>
<td>51.01</td>
<td>-.43</td>
</tr>
<tr>
<td>Personal</td>
<td>3.565</td>
<td>1.643</td>
<td>262</td>
<td>50.93</td>
<td>-.44</td>
</tr>
<tr>
<td>Humanising</td>
<td>3.548</td>
<td>1.340</td>
<td>261</td>
<td>50.69</td>
<td>-.45</td>
</tr>
<tr>
<td>Bossy</td>
<td>3.250</td>
<td>1.474</td>
<td>256</td>
<td>46.43</td>
<td>-.75</td>
</tr>
<tr>
<td>Threatening</td>
<td>3.174</td>
<td>1.493</td>
<td>259</td>
<td>45.34</td>
<td>-.83</td>
</tr>
<tr>
<td>Weak</td>
<td>2.850</td>
<td>1.366</td>
<td>254</td>
<td>40.71</td>
<td>-1.15</td>
</tr>
<tr>
<td>Disgusting</td>
<td>2.761</td>
<td>1.130</td>
<td>255</td>
<td>39.44</td>
<td>-1.24</td>
</tr>
<tr>
<td>Hindering</td>
<td>2.632</td>
<td>1.505</td>
<td>258</td>
<td>37.60</td>
<td>-1.37</td>
</tr>
</tbody>
</table>
FIGURE 27

Managers General Attitudes to Computers

Weights are from +3 to -3

P.R. Gamble
4.2 A Comparison of General Attitudes of British Hospitality Managers and American Professional Persons

Table 32 compares the scores obtained from the survey carried out for this research and that carried out in 1980 by Zoltan and Chapanis. In the American analysis scores were ranked 1 to 7 from right to left. In the British survey scores were ranked 7 to 1 from right to left. Thus the column for adjusted scores on the right of table 32 merely translates the American score to that used in this survey by deducting the value given from 8 to produce equivalent and comparable ratings.

A preliminary analysis of table 32 shows a surprising number of similarities. The first nine adjectives are the same set though listed in a slightly different sequence, American professional persons seeing speed as a more striking attribute of computers than their organisational qualities. Thus the beginning of each list would appear as follows:

<table>
<thead>
<tr>
<th>British</th>
<th>American</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systematic</td>
<td>Fast</td>
</tr>
<tr>
<td>Precise</td>
<td>Systematic</td>
</tr>
<tr>
<td>Organized</td>
<td>Precise</td>
</tr>
<tr>
<td>Efficient</td>
<td>Organized</td>
</tr>
<tr>
<td>Fast</td>
<td>Efficient</td>
</tr>
<tr>
<td>Desirable</td>
<td>Effective</td>
</tr>
<tr>
<td>Effective</td>
<td>Adaptable</td>
</tr>
<tr>
<td>Stimulating</td>
<td>Desirable</td>
</tr>
<tr>
<td>Challenging</td>
<td>Challenging</td>
</tr>
</tbody>
</table>

Whilst the American results are skewed more to the positive scorings with a smaller overall range, some attributes are seen more negatively. There appear to be 7 adjectives where differences between the two surveys are marked. These are identified from differences in the percentage score of 8% or more. 8% was chosen as an apparently natural breakpoint in the listing. Proceeding from the largest difference, computers are seen as less personal, less affordable, less personalising, less easy, more complicated, colder and less humanising by the American professional persons.

Setting aside the affordability which is probably a function of the relative cost of business computers in 1980 as opposed to 1984, the American perspective is generally that of a more clinical, less human
device than that obtained in the UK though neither group seems inclined to humanise computers.
## TABLE 32
A Comparison of General Attitudes of British Hospitality Managers and American Physicians, CPAs, Lawyers and Pharmacists

<table>
<thead>
<tr>
<th>ADJECTIVE</th>
<th>DATA FROM THE UK SURVEY</th>
<th></th>
<th>DATA FROM THE USA SURVEY</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>S.D.</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Systematic</td>
<td>6.32</td>
<td>.92</td>
<td>261</td>
<td>90.26</td>
</tr>
<tr>
<td>Precise</td>
<td>6.27</td>
<td>1.04</td>
<td>256</td>
<td>89.51</td>
</tr>
<tr>
<td>Organized</td>
<td>6.12</td>
<td>1.03</td>
<td>262</td>
<td>87.36</td>
</tr>
<tr>
<td>Efficient</td>
<td>6.07</td>
<td>1.05</td>
<td>258</td>
<td>86.74</td>
</tr>
<tr>
<td>Fast</td>
<td>6.02</td>
<td>1.23</td>
<td>259</td>
<td>85.94</td>
</tr>
<tr>
<td>Desirable</td>
<td>5.95</td>
<td>1.19</td>
<td>263</td>
<td>84.96</td>
</tr>
<tr>
<td>Effective</td>
<td>5.91</td>
<td>1.11</td>
<td>259</td>
<td>84.39</td>
</tr>
<tr>
<td>Stimulating</td>
<td>5.85</td>
<td>1.32</td>
<td>276</td>
<td>83.54</td>
</tr>
<tr>
<td>Challenging</td>
<td>5.81</td>
<td>1.21</td>
<td>262</td>
<td>83.04</td>
</tr>
<tr>
<td>Adaptable</td>
<td>5.66</td>
<td>1.27</td>
<td>271</td>
<td>80.91</td>
</tr>
<tr>
<td>Reliable</td>
<td>5.49</td>
<td>1.35</td>
<td>267</td>
<td>78.44</td>
</tr>
<tr>
<td>Enjoyable</td>
<td>5.44</td>
<td>1.25</td>
<td>259</td>
<td>77.66</td>
</tr>
<tr>
<td>Dependable</td>
<td>5.43</td>
<td>1.37</td>
<td>261</td>
<td>77.61</td>
</tr>
<tr>
<td>Trustworthy</td>
<td>5.30</td>
<td>1.38</td>
<td>260</td>
<td>75.77</td>
</tr>
<tr>
<td>Formal</td>
<td>5.16</td>
<td>1.37</td>
<td>233</td>
<td>73.74</td>
</tr>
<tr>
<td>Predictable</td>
<td>5.14</td>
<td>1.33</td>
<td>261</td>
<td>73.46</td>
</tr>
<tr>
<td>Clear</td>
<td>5.13</td>
<td>1.47</td>
<td>257</td>
<td>73.26</td>
</tr>
<tr>
<td>Fun</td>
<td>5.11</td>
<td>1.42</td>
<td>263</td>
<td>73.00</td>
</tr>
<tr>
<td>Co-operative</td>
<td>5.00</td>
<td>1.39</td>
<td>250</td>
<td>71.49</td>
</tr>
<tr>
<td>Flexible</td>
<td>4.95</td>
<td>1.66</td>
<td>256</td>
<td>70.70</td>
</tr>
<tr>
<td>Intelligent</td>
<td>4.79</td>
<td>1.75</td>
<td>257</td>
<td>68.37</td>
</tr>
<tr>
<td>Patient</td>
<td>4.75</td>
<td>1.44</td>
<td>258</td>
<td>67.83</td>
</tr>
<tr>
<td>Easy</td>
<td>4.51</td>
<td>1.76</td>
<td>259</td>
<td>64.37</td>
</tr>
<tr>
<td>Demanding</td>
<td>4.41</td>
<td>1.65</td>
<td>262</td>
<td>62.93</td>
</tr>
<tr>
<td>Complicated</td>
<td>4.38</td>
<td>1.57</td>
<td>260</td>
<td>62.53</td>
</tr>
<tr>
<td>Conventional</td>
<td>4.29</td>
<td>1.36</td>
<td>253</td>
<td>61.31</td>
</tr>
<tr>
<td>Cold</td>
<td>4.29</td>
<td>1.34</td>
<td>254</td>
<td>61.30</td>
</tr>
<tr>
<td>Affordable</td>
<td>4.25</td>
<td>1.94</td>
<td>258</td>
<td>60.69</td>
</tr>
<tr>
<td>Dominant</td>
<td>4.13</td>
<td>1.24</td>
<td>257</td>
<td>58.93</td>
</tr>
<tr>
<td>Infallible</td>
<td>4.10</td>
<td>1.55</td>
<td>259</td>
<td>58.57</td>
</tr>
<tr>
<td>Personalising</td>
<td>3.73</td>
<td>1.48</td>
<td>259</td>
<td>53.23</td>
</tr>
<tr>
<td>Noisy</td>
<td>3.69</td>
<td>1.54</td>
<td>257</td>
<td>52.76</td>
</tr>
<tr>
<td>Frustrating</td>
<td>3.64</td>
<td>1.68</td>
<td>260</td>
<td>51.93</td>
</tr>
<tr>
<td>Forgiving</td>
<td>3.57</td>
<td>1.41</td>
<td>254</td>
<td>51.01</td>
</tr>
<tr>
<td>Personal</td>
<td>3.57</td>
<td>1.64</td>
<td>262</td>
<td>50.93</td>
</tr>
<tr>
<td>Humanising</td>
<td>3.55</td>
<td>1.34</td>
<td>261</td>
<td>50.69</td>
</tr>
<tr>
<td>Bossy</td>
<td>3.25</td>
<td>1.47</td>
<td>256</td>
<td>46.43</td>
</tr>
<tr>
<td>Threatening</td>
<td>3.17</td>
<td>1.49</td>
<td>259</td>
<td>45.34</td>
</tr>
<tr>
<td>Weak</td>
<td>2.85</td>
<td>1.37</td>
<td>254</td>
<td>40.71</td>
</tr>
<tr>
<td>Disgusting</td>
<td>2.76</td>
<td>1.13</td>
<td>253</td>
<td>39.44</td>
</tr>
<tr>
<td>Hindering</td>
<td>2.63</td>
<td>1.51</td>
<td>259</td>
<td>37.60</td>
</tr>
</tbody>
</table>

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In order to compare the results more exactly, two further tests were carried out. The first of these examines the extent to which the means for each pair of adjectives is significantly different. The method for testing the difference between sample means is well established. A formula given by Conway (27) was used to compute the standard error of the differences.

\[
S.E. \text{ of difference } (m_1 - m_2) = \sqrt{\frac{S.D._1^2}{n_1} + \frac{S.D._2^2}{n_2}}
\]

In order to compute the standard error of the mean for both samples it was necessary to obtain the standard deviations from the American data which had not been published in the original paper. These were kindly supplied directly by Dr. Zoltan-Ford now at Towson State University, Maryland.

Formula (1) was applied by taking the square root of the two standard errors multiplied by a factor of two in order to provide a test at the 95% confidence level. This is compared with the actual difference between the means. Where the actual difference is less than twice the standard error of the difference, there is no evidence that the adjective has been scored differently at the 95% confidence level.

Results are summarised in table 33. By this method it will be observed that 21 or approximately half of the 41 adjectives listed in common are scored significantly different. If the confidence level is increased to 99% this falls to 13 pairs. In view of this result which is hardly conclusive it would be difficult to argue that significant differences exist between the general attitudes to computers of the two groups.
### TABLE 33

Test of Significant Differences Between the Generalised UK Management Attitudes and those from the USA Survey

<table>
<thead>
<tr>
<th>Attitude</th>
<th>S.E. (UK)</th>
<th>S.E. (USA)</th>
<th>Diff. S.E.</th>
<th>Observe Diff.</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systematic</td>
<td>.06</td>
<td>.04</td>
<td>.07</td>
<td>.08</td>
<td>Not Sig</td>
</tr>
<tr>
<td>Precise</td>
<td>.06</td>
<td>.04</td>
<td>.08</td>
<td>.04</td>
<td>Not Sig</td>
</tr>
<tr>
<td>Organized</td>
<td>.06</td>
<td>.05</td>
<td>.08</td>
<td>.04</td>
<td>Not Sig</td>
</tr>
<tr>
<td>Efficient</td>
<td>.06</td>
<td>.04</td>
<td>.08</td>
<td>.00</td>
<td>Not Sig</td>
</tr>
<tr>
<td>Fast</td>
<td>.08</td>
<td>.04</td>
<td>.09</td>
<td>.36</td>
<td>Sig</td>
</tr>
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<td>Desirable</td>
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</tr>
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<td>.06</td>
<td>.10</td>
<td>.76</td>
<td>Sig</td>
</tr>
<tr>
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<td>.10</td>
<td>.07</td>
<td>.12</td>
<td>.17</td>
<td>Not Sig</td>
</tr>
<tr>
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<td>.09</td>
<td>.07</td>
<td>.11</td>
<td>.78</td>
<td>Sig</td>
</tr>
<tr>
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<td>.10</td>
<td>.06</td>
<td>.11</td>
<td>.02</td>
<td>Not Sig</td>
</tr>
<tr>
<td>Frustrating</td>
<td>.10</td>
<td>.07</td>
<td>.12</td>
<td>.09</td>
<td>Not Sig</td>
</tr>
<tr>
<td>Forgiving</td>
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<td>.27</td>
<td>Sig</td>
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<tr>
<td>Personal</td>
<td>.10</td>
<td>.07</td>
<td>.12</td>
<td>1.01</td>
<td>Sig</td>
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<td>.08</td>
<td>.06</td>
<td>.10</td>
<td>.55</td>
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<tr>
<td>Bossy</td>
<td>.09</td>
<td>.07</td>
<td>.11</td>
<td>.20</td>
<td>Not Sig</td>
</tr>
<tr>
<td>Threatening</td>
<td>.09</td>
<td>.07</td>
<td>.11</td>
<td>.04</td>
<td>Not Sig</td>
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<td>.09</td>
<td>.06</td>
<td>.10</td>
<td>.23</td>
<td>Sig</td>
</tr>
<tr>
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<td>.07</td>
<td>.05</td>
<td>.09</td>
<td>.25</td>
<td>Sig</td>
</tr>
<tr>
<td>Hindering</td>
<td>.09</td>
<td>.06</td>
<td>.11</td>
<td>.37</td>
<td>Sig</td>
</tr>
</tbody>
</table>
In selecting further tests to compare these results it was important to use a method suitable for non-parametric data. The scoring used for the adjectives is arbitrary. It was therefore determined to use the Wilcoxin rank sum test as appropriate to experiments of this kind. The Wilcoxin test is an alternative to the two sample t-test. Both tests are sensitive to differences in location (mean or median) as opposed to dispersion or spread. However, the rank sum test requires fewer assumptions than the t-test. It does not assume population normality and uses less information from the data. The test considers the magnitude of each matched pair and not just the direction or sign of the difference. Only ordering information is relevant to the rank sum test and it is therefore particularly useful as in this case when data are both ordinal and qualitative.

The method for the test, described by Mendenhall and Reinmuth (28), is as follows. Differences between pairs are calculated. Differences of zero are eliminated thus reducing the effective sample size. Absolute values of the differences are ranked, assigning 1 to the smallest, 2 to the second smallest and so on. In the case of a tie, an average rank is assigned. Under the null hypothesis of no difference it would be expected that half the differences would be positive and half would be negative thus the expected rank sums for negative and positive differences should be equal. If one population is shifted to the right or left of the other this will be reflected in the sum of ranks.

The smaller of the two rank sums (the lower tail critical value), designated as $T$, is used as a test statistic to test the null hypothesis that the two population relative frequency histograms are identical. The sum of ranks will be proportional to sample size and critical values of $T$ can be obtained from tables.

The results of this comparison are given in table 34. As in table 33, this is a two tailed test and at the 95% confidence level the critical value is 264. Since the observed value of $T$ is less than the lower extreme of the rejection region, the null hypothesis that there is no difference between the two populations must be rejected.

However, once again, the evidence for assuming that the two populations...
are different is not especially strong. If the precision of the data were reduced to one decimal place, a further 6 pairs would be eliminated. The test statistic obtained exceeds the critical value for $N = 36$ where the test statistic is 208. Furthermore, Ott (29) has shown that the procedure described above is generally conservative.

Given the differences in culture, education, sex and above all the date at which each of these surveys was conducted, there is no overwhelming evidence to support the view that the general attitudes of British hospitality managers are significantly different from those of American persons in professional occupations.
A Wilcoxon Paired Difference Test on the Mean Scores obtained from the General Attitude to Computers of British and American Managers

<table>
<thead>
<tr>
<th>WILCOXIN TEST</th>
<th>Score (UK)</th>
<th>Score (USA)</th>
<th>Absolute Diff</th>
<th>+ve Rank</th>
<th>-ve Rank</th>
</tr>
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<tr>
<td>Efficient</td>
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<td>6.07</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Noisy</td>
<td>3.69</td>
<td>3.67</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Organized</td>
<td>6.12</td>
<td>6.15</td>
<td>0.03</td>
<td>0.03</td>
<td>2.5</td>
</tr>
<tr>
<td>Effective</td>
<td>5.91</td>
<td>5.94</td>
<td>0.03</td>
<td>0.03</td>
<td>2.5</td>
</tr>
<tr>
<td>Precise</td>
<td>6.27</td>
<td>6.23</td>
<td>0.04</td>
<td>0.04</td>
<td>4.5</td>
</tr>
<tr>
<td>Threatening</td>
<td>3.17</td>
<td>3.21</td>
<td>0.04</td>
<td>0.04</td>
<td>4.5</td>
</tr>
<tr>
<td>Demanding</td>
<td>4.41</td>
<td>4.36</td>
<td>0.05</td>
<td>0.05</td>
<td>6</td>
</tr>
<tr>
<td>Fun</td>
<td>5.11</td>
<td>5.05</td>
<td>0.06</td>
<td>0.06</td>
<td>7.5</td>
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<tr>
<td>Reliable</td>
<td>5.49</td>
<td>5.55</td>
<td>0.06</td>
<td>0.06</td>
<td>7.5</td>
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<td>Systematic</td>
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<td>0.08</td>
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<td>0.08</td>
<td>9.5</td>
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<td>5.30</td>
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<td>0.09</td>
<td>0.09</td>
<td>12</td>
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<td>Patient</td>
<td>4.75</td>
<td>4.66</td>
<td>0.09</td>
<td>0.09</td>
<td>12</td>
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<tr>
<td>Frustrating</td>
<td>3.64</td>
<td>3.55</td>
<td>0.09</td>
<td>0.09</td>
<td>12</td>
</tr>
<tr>
<td>Co-operative</td>
<td>5.00</td>
<td>4.84</td>
<td>0.16</td>
<td>0.16</td>
<td>14</td>
</tr>
<tr>
<td>Infallible</td>
<td>4.10</td>
<td>3.93</td>
<td>0.17</td>
<td>0.17</td>
<td>15</td>
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<tr>
<td>Intelligent</td>
<td>4.79</td>
<td>4.60</td>
<td>0.19</td>
<td>0.19</td>
<td>16</td>
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<td>Desirable</td>
<td>5.95</td>
<td>5.75</td>
<td>0.20</td>
<td>0.20</td>
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<td>4.09</td>
<td>0.20</td>
<td>0.20</td>
<td>18</td>
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<td>Bossy</td>
<td>3.25</td>
<td>3.05</td>
<td>0.20</td>
<td>0.20</td>
<td>18</td>
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<td>Clear</td>
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<td>0.21</td>
<td>20</td>
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<tr>
<td>Formal</td>
<td>5.16</td>
<td>4.93</td>
<td>0.23</td>
<td>0.23</td>
<td>21.5</td>
</tr>
<tr>
<td>Weak</td>
<td>2.85</td>
<td>2.62</td>
<td>0.23</td>
<td>0.23</td>
<td>21.5</td>
</tr>
<tr>
<td>Adaptable</td>
<td>5.66</td>
<td>5.89</td>
<td>0.23</td>
<td>0.23</td>
<td>23</td>
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<tr>
<td>Disgusting</td>
<td>2.76</td>
<td>3.01</td>
<td>0.25</td>
<td>0.25</td>
<td>24</td>
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<tr>
<td>Forgiving</td>
<td>3.57</td>
<td>3.30</td>
<td>0.27</td>
<td>0.27</td>
<td>25</td>
</tr>
<tr>
<td>Dependable</td>
<td>5.43</td>
<td>5.71</td>
<td>0.28</td>
<td>0.28</td>
<td>26</td>
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<tr>
<td>Fast</td>
<td>6.02</td>
<td>6.38</td>
<td>0.36</td>
<td>0.36</td>
<td>27.5</td>
</tr>
<tr>
<td>Predictable</td>
<td>5.14</td>
<td>5.50</td>
<td>0.36</td>
<td>0.36</td>
<td>27.5</td>
</tr>
<tr>
<td>Hindering</td>
<td>2.63</td>
<td>2.26</td>
<td>0.37</td>
<td>0.37</td>
<td>29</td>
</tr>
<tr>
<td>Stimulating</td>
<td>5.85</td>
<td>5.46</td>
<td>0.39</td>
<td>0.39</td>
<td>30</td>
</tr>
<tr>
<td>Flexible</td>
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<td>4.55</td>
<td>0.40</td>
<td>0.40</td>
<td>31.5</td>
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<tr>
<td>Enjoyable</td>
<td>5.64</td>
<td>5.04</td>
<td>0.40</td>
<td>0.40</td>
<td>31.5</td>
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<tr>
<td>Humanising</td>
<td>3.55</td>
<td>3.00</td>
<td>0.55</td>
<td>0.55</td>
<td>33</td>
</tr>
<tr>
<td>Cold</td>
<td>4.29</td>
<td>4.12</td>
<td>0.63</td>
<td>0.63</td>
<td>34</td>
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<tr>
<td>Complicated</td>
<td>4.38</td>
<td>5.02</td>
<td>0.64</td>
<td>0.64</td>
<td>35</td>
</tr>
<tr>
<td>Easy</td>
<td>4.51</td>
<td>3.78</td>
<td>0.73</td>
<td>0.73</td>
<td>36</td>
</tr>
<tr>
<td>Dominant</td>
<td>4.13</td>
<td>3.37</td>
<td>0.76</td>
<td>0.76</td>
<td>37</td>
</tr>
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<td>3.73</td>
<td>2.95</td>
<td>0.78</td>
<td>0.78</td>
<td>38</td>
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<td>Affordable</td>
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<td>0.90</td>
<td>0.90</td>
<td>39</td>
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<td>Personal</td>
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<td>2.56</td>
<td>1.01</td>
<td>1.01</td>
<td>40</td>
</tr>
</tbody>
</table>

Sum of ranks 606 214

From tables, where n = 40 and a = .05 the test statistic is = 264
The observed value of T is less than the critical value so that the null hypothesis (that there is no difference) is rejected. The population distributions are not identical.
4.3 General Statements About Computers by Hospitality Managers

The second part of the attitudinal analysis consisted of a series of Likert-type statements about computers with which managers were asked to express agreement or disagreement. The method of scoring on a 7 point scale was similar to that used for the general attitudinal analysis. Thus the scale ran from 'strongly agree' which was scored as 7, through 'neutral' scored as 4, to 'strongly disagree' scored as 1.

25 statements were chosen, of which 11 were based on the American survey. Exact replication was not deemed to be appropriate to this section of the survey for two reasons. In contrast to general attitudinal statements, it was expected that these statements would be perceived as more context specific. In addition, statements were selected so as to offer further insights into the attitudes of hospitality managers to computer based innovation. Statements were therefore chosen to obtain opinions on factors which may be thought to inhibit such developments. For example, "my subordinates would not co-operate with a computer based system".

The wording of each sentence was based on the style adopted by Cohn (30) to measure preferences for change and to measure risk. Thus preferences for change were assessed with questions such as, "society relies too heavily on computers", and "more computers would be helpful to me in my work". Preferences for risk were measured with questions such as, "it is harder to make changes to procedures when computers are used". In order to test for bias, some questions were repeated in a slightly different form. Thus the assertion, "companies which use computers are more efficient", is similar to, "most hotel guests think that computers make hotels efficient".

A summary of results is available in table 35. The value for weight in the right hand column is calculated by deducting the indifference factor of 4, as was done for table 31. This facilitates the graphical presentation in figure 28.

From figure 28 it can be clearly seen that the general response to the statements is positive. The most firmly held view is very supportive of the results of table 29 which examined managers attitudes to support from
the computer industry, where supplier's training was seen as deficient. Hotel and catering managers also strongly believe that they need more training themselves for working with computers.

Some general attitudes reflected by the adjective scores are reinforced by strong agreement with statements to the effect that computers simplify complex problems, help managers at work and are fun to use. This is consistent with the use of adjectives like, systematic, fast, organized, efficient and to a lesser extent, challenging and stimulating.
### TABLE 35

**Statements about the Use of Computers by UK Hotel and Catering Managers**

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>Mean</th>
<th>S.D.</th>
<th>n</th>
<th>%</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>H&amp;H mgns. need more training</td>
<td>6.164</td>
<td>.959</td>
<td>305</td>
<td>88.06</td>
<td>2.16</td>
</tr>
<tr>
<td>Simplify complex problems</td>
<td>5.705</td>
<td>1.990</td>
<td>302</td>
<td>81.50</td>
<td>1.71</td>
</tr>
<tr>
<td>Mgrns. limit use of comp.</td>
<td>5.602</td>
<td>1.389</td>
<td>304</td>
<td>80.03</td>
<td>1.60</td>
</tr>
<tr>
<td>Comp. save a lot of time</td>
<td>5.595</td>
<td>1.228</td>
<td>304</td>
<td>79.93</td>
<td>1.60</td>
</tr>
<tr>
<td>More comp. help me at work</td>
<td>5.245</td>
<td>1.553</td>
<td>302</td>
<td>74.93</td>
<td>1.25</td>
</tr>
<tr>
<td>Comp. makes job more fun</td>
<td>5.197</td>
<td>1.338</td>
<td>304</td>
<td>74.24</td>
<td>1.20</td>
</tr>
<tr>
<td>Money savings offset disads.</td>
<td>4.868</td>
<td>1.408</td>
<td>302</td>
<td>69.54</td>
<td>.87</td>
</tr>
<tr>
<td>Cos. which use are more eff.</td>
<td>4.630</td>
<td>1.401</td>
<td>303</td>
<td>66.14</td>
<td>.63</td>
</tr>
<tr>
<td>Comp. hotels are efficient</td>
<td>4.469</td>
<td>1.565</td>
<td>292</td>
<td>63.84</td>
<td>.47</td>
</tr>
<tr>
<td>May erase files accidentally</td>
<td>4.253</td>
<td>1.800</td>
<td>300</td>
<td>60.76</td>
<td>.25</td>
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<tr>
<td>Easier to err with comps.</td>
<td>4.248</td>
<td>1.581</td>
<td>302</td>
<td>60.69</td>
<td>.25</td>
</tr>
<tr>
<td>Speed is over estimated</td>
<td>4.157</td>
<td>1.668</td>
<td>300</td>
<td>59.39</td>
<td>.16</td>
</tr>
<tr>
<td>Must learn special language</td>
<td>4.066</td>
<td>1.986</td>
<td>302</td>
<td>58.09</td>
<td>.07</td>
</tr>
<tr>
<td>Longer to train staff</td>
<td>3.781</td>
<td>1.577</td>
<td>302</td>
<td>54.01</td>
<td>-.22</td>
</tr>
<tr>
<td>Comp. will cost some jobs</td>
<td>3.733</td>
<td>1.799</td>
<td>303</td>
<td>53.33</td>
<td>-.27</td>
</tr>
<tr>
<td>Harder to change procedure</td>
<td>3.618</td>
<td>1.708</td>
<td>304</td>
<td>51.69</td>
<td>-.38</td>
</tr>
<tr>
<td>Society relies too heavily</td>
<td>3.574</td>
<td>1.662</td>
<td>303</td>
<td>51.06</td>
<td>-.43</td>
</tr>
<tr>
<td>Comp. no use lang. of industr.</td>
<td>3.525</td>
<td>1.516</td>
<td>299</td>
<td>50.36</td>
<td>-.48</td>
</tr>
<tr>
<td>Comp. will assume mngt. jobs</td>
<td>3.434</td>
<td>1.607</td>
<td>304</td>
<td>49.06</td>
<td>-.37</td>
</tr>
<tr>
<td>Cannot harm a computer</td>
<td>3.122</td>
<td>1.560</td>
<td>303</td>
<td>44.60</td>
<td>-.88</td>
</tr>
<tr>
<td>Subords. would not co-operate</td>
<td>2.913</td>
<td>1.572</td>
<td>300</td>
<td>41.61</td>
<td>-1.09</td>
</tr>
<tr>
<td>Boss doesn’t believe in comp.</td>
<td>2.794</td>
<td>1.710</td>
<td>291</td>
<td>39.91</td>
<td>-1.21</td>
</tr>
<tr>
<td>Comp. will reduce job interest</td>
<td>2.602</td>
<td>1.336</td>
<td>304</td>
<td>37.17</td>
<td>-1.40</td>
</tr>
<tr>
<td>Decisions too complex</td>
<td>2.595</td>
<td>1.375</td>
<td>304</td>
<td>37.07</td>
<td>-1.41</td>
</tr>
<tr>
<td>Comp. are for clerks/secs.</td>
<td>2.497</td>
<td>1.401</td>
<td>306</td>
<td>35.67</td>
<td>-1.50</td>
</tr>
</tbody>
</table>

7 = strongly agree  
4 = neutral  
1 = strongly disagree

P.R. Gamble
FIGURE 28

Likert Statements about Computers

Comps. are for clerks/secs.
Decisions too complex
Comp. will reduce job interest
Boss doesn't believe in comp.
Subords. would not co-operate
Cannot harm a computer
Comp. will assume mngt. jobs
Comp. no use lang. of indus.
Society relies too heavily
Harder to change procedure
Comp. will cost some jobs
Longer to train staff
Must learn special language
Speed is over estimated
Easier to err with comps.
May erase files accidentally
Comp. hotels are efficient
Cos. which use are more eff.
Money savings offset disads.
Comp. makes job more fun
More comp. help me at work
Comp. save a lot of time
Mngrs. limit use of comp.
Simplify complex problems
H&C mngrs. need more training

Likert statements weighted +3 to -3

P.R. Gamble
To assess inhibitory factors which may limit the use of computers in the hospitality industry, statements were included which might show whether managers were seeking to distance themselves from this technology. There is no evidence to support such a view. Neither bosses nor subordinates are seen as constraints on the use of computers. No major reservations are expressed in terms of expense, training, job losses, quality of life or conditions of use. Interestingly, there is slightly stronger agreement with the statement that computerised companies are more efficient than the statement that computerised hotels are more efficient. Presumably, computers are seen as adding slightly more to non-service businesses.

The main limiting factor is identified by managers as the managers themselves, not the machines. This coincides closely with the views expressed by other surveys. Computers are seen (rightly or wrongly) as devices which can simplify complex problems and there is little support for the view that management decisions are too complex for a computer. The problems of deployment are attributed to a lack of training.

That middle managers are the major inhibitory factor in using computers for the hotel and catering industry is similar to the result obtained by Heidrick and Struggles two years earlier. Whether this is entirely attributable to a lack of training is perhaps more questionable. For example in 1985 PA Management Consultants conducted a survey of executive perceptions of office automation (31).

Based on 156 returns from the chief executives of the Times top 1,000 companies, their results revealed what was described as a disturbing mismatch between the expectations of top managers and their companies' information technology (IT) strategies. Thus while 61% of chief executives expected to obtain improved information and communications, only 31% explicitly targeted this kind of improvement in their corporate strategy. 52% expected more support for management from IT, and 32% expected more support for sales strategy. However, only 22% and 13% have addressed these issues respectively when applying IT to their corporate needs.

The survey concludes that the orientation of most corporate IT strategies was a strong bias towards data processing. It suggests that, "most of the companies have a technical rather than a business-orientated
approach to the realisation of IT projects*. In practice it appears that chief executives have minimal involvement with the framing of corporate information technology strategy, as a rule being brought in only at the final stage when financial approval is sought. The reasons put forward to explain this are based partly on caution, a reluctance to innovate with computers and partly on ignorance. Most chief executives are ignorant of what IT has to offer, PA observing diplomatically, "the general impression which was gained during the study was that they are not as well informed about IT as they might wish to be".

The exception to this position in the PA survey was building societies, which were planning to integrate IT with sales operations. Elsewhere (32), the deployment of IT to obtain specific competitive advantage has been claimed as central by tour operator Thomson Holidays. Like the building societies, this is a company which is integrating management information and sales operations. It has done so in a way which is specifically designed to improve its competitive position. It may be interesting to note that one of the hotel general managers interviewed in the case studies reported in chapter 7 argued that hotels were in a different position in regard to computer applications compared to many other businesses. Hotels seek both to operate and manage through the same systems in a more integrated fashion. In this respect hotels might be expected to operate like the building societies or the tour operator.

The PA survey results are entirely consistent with Cohn's (33) findings in 1980. For reasons which PA have explained, Cohn found no consistent relationship between presidential (chief executive) attitudes and adoption of technological innovation. Cohn found that whilst favourable attitudes towards new technology by the total managerial staff helped to promote necessary co-operation, unfavourable attitudes to risk and change did not impede adoption. Decisions to bring innovations in for trial are made typically by a small group of managers who bear the risks.

A data processing orientation was discovered in the attitudes of the managers interviewed in chapter 3. Coupled with a perceived lack of training by the senior middle managers responding to the present survey these two factors could explain the heavy clerical emphasis to the systems employed in the hotel and catering industry. The potential benefits of
Computers and Innovation in the Hospitality Industry

Chapter 6

competitive advantage from IT, outlined by Porter and Millar (34) are thus lost. Such an orientation deprives the hospitality industry of the prospect of using IT to change the industry structure as has happened with building societies and airlines or to obtain competitive advantage in the same way as tour operators. However, it does not appear that this perspective contrasts sharply with that of other British managers.

4.4 A Comparison of General Statements About Computers
by UK Hospitality Managers and American Professional Persons

The British hospitality managers' attitudes are in more marked contrast to those of American professional persons. Table 36 summarises the scores obtained from each survey for the eleven statements which were comparable.

In four of these statements, the two groups differ quite strongly. Thus the American professionals were less inclined to the view that society relies too heavily on computers and that short of physical violence you cannot damage a computer. British managers saw themselves much more as limiting factors on the use of computers and were more inclined to the view that a computer's capabilities for speed are often overestimated.

The social question is clearly one of personal judgement. The constraints imposed by managers themselves seems to show a greater self awareness on the part of the British managers. Similarly, the view of the machine as an inviolable, fast data processor on the part of American managers is possibly indicative of a lesser experience of computers in actual use. Though it must be noted that the extent to which computer operations are likely to be central to the activities of the professionals will be less.
### TABLE 36

**Statement Scores of BRITISH Hospitality Managers**

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>Mean</th>
<th>S.D.</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simplify complex problems</td>
<td>5.71</td>
<td>1.99</td>
<td>302</td>
<td>81.50</td>
</tr>
<tr>
<td>Mngrs. limit use of comp.</td>
<td>5.60</td>
<td>1.39</td>
<td>304</td>
<td>80.03</td>
</tr>
<tr>
<td>More comp. help me at work</td>
<td>5.25</td>
<td>1.55</td>
<td>302</td>
<td>74.93</td>
</tr>
<tr>
<td>Money savings offset disads.</td>
<td>4.87</td>
<td>1.41</td>
<td>302</td>
<td>69.54</td>
</tr>
<tr>
<td>May erase files accidentally</td>
<td>4.25</td>
<td>1.80</td>
<td>300</td>
<td>60.76</td>
</tr>
<tr>
<td>Speed is over estimated</td>
<td>4.16</td>
<td>1.67</td>
<td>300</td>
<td>59.39</td>
</tr>
<tr>
<td>Must learn special language</td>
<td>4.07</td>
<td>1.99</td>
<td>302</td>
<td>58.09</td>
</tr>
<tr>
<td>Society relies too heavily</td>
<td>3.57</td>
<td>1.66</td>
<td>303</td>
<td>51.06</td>
</tr>
<tr>
<td>Comp. no use lang. of indus.</td>
<td>3.53</td>
<td>1.52</td>
<td>299</td>
<td>50.36</td>
</tr>
<tr>
<td>Cannot harm a computer</td>
<td>3.12</td>
<td>1.56</td>
<td>303</td>
<td>44.60</td>
</tr>
<tr>
<td>Comp. are for clerks/secis.</td>
<td>2.50</td>
<td>1.40</td>
<td>306</td>
<td>35.67</td>
</tr>
</tbody>
</table>

**Statement Scores of AMERICAN Professional Persons**

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>Adj. Sc.</th>
<th>S.D.</th>
<th>%</th>
<th>% Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simplify complex problems</td>
<td>5.04</td>
<td>1.16</td>
<td>72.00</td>
<td>9.50</td>
</tr>
<tr>
<td>Mngrs. limit use of comp.</td>
<td>4.41</td>
<td>1.61</td>
<td>63.00</td>
<td>17.03</td>
</tr>
<tr>
<td>More comp. help me at work</td>
<td>4.60</td>
<td>1.43</td>
<td>65.71</td>
<td>9.21</td>
</tr>
<tr>
<td>Money savings offset disads.</td>
<td>4.11</td>
<td>1.33</td>
<td>58.71</td>
<td>10.83</td>
</tr>
<tr>
<td>May erase files accidentally</td>
<td>3.82</td>
<td>1.55</td>
<td>54.57</td>
<td>6.19</td>
</tr>
<tr>
<td>Speed is over estimated</td>
<td>2.20</td>
<td>1.68</td>
<td>31.43</td>
<td>27.96</td>
</tr>
<tr>
<td>Must learn special language</td>
<td>3.91</td>
<td>1.68</td>
<td>55.86</td>
<td>2.23</td>
</tr>
<tr>
<td>Society relies too heavily</td>
<td>2.39</td>
<td>1.76</td>
<td>34.14</td>
<td>16.91</td>
</tr>
<tr>
<td>Comp. no use lang. of indus.</td>
<td>4.35</td>
<td>1.40</td>
<td>62.14</td>
<td>-11.79</td>
</tr>
<tr>
<td>Cannot harm a computer</td>
<td>1.68</td>
<td>1.35</td>
<td>24.00</td>
<td>20.60</td>
</tr>
<tr>
<td>Need good typing skills</td>
<td>2.59</td>
<td>1.68</td>
<td>37.00</td>
<td>-1.33</td>
</tr>
</tbody>
</table>
It must also be observed that exposure to the use of small computers in business applications changed greatly over the four years between these two surveys for reasons explained earlier. It is therefore unsurprising that the statements pertaining to the application of computers in work related situations obtain different results.

Individually, nine of the eleven statements are significantly different at the 95% confidence level. As can be seen from table 37, there is no significant difference between the two groups over the statement that you need to learn a special language to work with computers. They are equally agreed that computers should not be used principally by secretaries and clerks. However there are significant differences in all other statements.

The results of the Wilcoxin rank sum test are therefore more easy to accept in this case. The effective sample size would not be reduced by a change in the precision of the results. It may therefore be concluded that the views of the two populations are not the same. In the light of the similarity of general attitudes, this difference is attributed to alterations in the business and computing environments that occurred between the two surveys.
**TABLE 37**

Test of Significant Differences Between British Hospitality Managers and American Professional Persons over General Statements about Computers

<table>
<thead>
<tr>
<th>SIGNIFICANT DIFFERENCES</th>
<th>S.E. (UK)</th>
<th>S.E. (USA)</th>
<th>S.E. Diff.</th>
<th>Observe Diff.</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simplify complex problems</td>
<td>.11</td>
<td>.05</td>
<td>.13</td>
<td>.67</td>
<td>Sig</td>
</tr>
<tr>
<td>Mngrs. limit use of comp.</td>
<td>.08</td>
<td>.07</td>
<td>.11</td>
<td>1.19</td>
<td>Sig</td>
</tr>
<tr>
<td>More comp. help me at work</td>
<td>.09</td>
<td>.06</td>
<td>.11</td>
<td>.65</td>
<td>Sig</td>
</tr>
<tr>
<td>Money savings offset disads.</td>
<td>.08</td>
<td>.06</td>
<td>.10</td>
<td>.76</td>
<td>Sig</td>
</tr>
<tr>
<td>May erase files accidentally</td>
<td>.10</td>
<td>.07</td>
<td>.12</td>
<td>.43</td>
<td>Sig</td>
</tr>
<tr>
<td>Speed is over estimated</td>
<td>.10</td>
<td>.07</td>
<td>.12</td>
<td>1.96</td>
<td>Sig</td>
</tr>
<tr>
<td>Must learn special language</td>
<td>.11</td>
<td>.07</td>
<td>.14</td>
<td>.16</td>
<td>Not Sig</td>
</tr>
<tr>
<td>Society relies too heavily</td>
<td>.10</td>
<td>.08</td>
<td>.12</td>
<td>1.18</td>
<td>Sig</td>
</tr>
<tr>
<td>Comp. no use lang. of indus.</td>
<td>.09</td>
<td>.06</td>
<td>.11</td>
<td>.83</td>
<td>Sig</td>
</tr>
<tr>
<td>Cannot harm a computer</td>
<td>.09</td>
<td>.06</td>
<td>.11</td>
<td>1.44</td>
<td>Sig</td>
</tr>
<tr>
<td>Comps. are for clerks/secs.</td>
<td>.08</td>
<td>.07</td>
<td>.11</td>
<td>.09</td>
<td>Not Sig</td>
</tr>
</tbody>
</table>

A Wilcoxin Paired Difference Test on the Mean Score obtained from General Statements about Computers for British Managers and American Professionals

<table>
<thead>
<tr>
<th>WILCOXIN TEST</th>
<th>Score (UK)</th>
<th>Score (USA)</th>
<th>Diff.</th>
<th>Abs. Diff.</th>
<th>+ve Rank</th>
<th>-ve Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comps. are for clerks/secs.</td>
<td>2.50</td>
<td>2.59</td>
<td>-.09</td>
<td>.09</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Must learn special language</td>
<td>4.07</td>
<td>3.91</td>
<td>.16</td>
<td>.16</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>May erase files accidentally</td>
<td>4.25</td>
<td>3.82</td>
<td>.43</td>
<td>.43</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>More comp. help me at work</td>
<td>5.25</td>
<td>4.60</td>
<td>.65</td>
<td>.65</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Simplify complex problems</td>
<td>5.71</td>
<td>5.04</td>
<td>.67</td>
<td>.67</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Money savings offset disads.</td>
<td>4.84</td>
<td>4.11</td>
<td>.73</td>
<td>.73</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Comp. no use lang. of indus.</td>
<td>3.53</td>
<td>4.35</td>
<td>-.82</td>
<td>.82</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Society relies too heavily</td>
<td>3.57</td>
<td>2.39</td>
<td>1.18</td>
<td>1.18</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Mngrs. limit use of comp.</td>
<td>5.60</td>
<td>4.41</td>
<td>1.19</td>
<td>1.19</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Cannot harm a computer</td>
<td>3.12</td>
<td>1.68</td>
<td>1.44</td>
<td>1.44</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Speed is over estimated</td>
<td>4.16</td>
<td>2.20</td>
<td>1.96</td>
<td>1.96</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>

For n = 11, and a = .05, T = 11

Since 8 < 11 then the null hypothesis that the populations are the same, must be rejected.
Some Individual Differences in Attitudes to Computers

Individual differences between responses were examined by using the chi-square ($X^2$) test. This test measures statistical dependence but does not measure the strength of any relationship between variables. The reason being that both sample size and table size have such an influence on chi-square. If the sample is very large, even small deviations will generate statistically significant chi-squares. Where expected cell values are less than 5 then the test tends to become inaccurate. Taking these factors into account, three areas were found to produce interesting results. In each case, one variable was tested against the 25 statements offered at the end of the questionnaire.

5.1 Attitudes and Membership of a Trade Union

Respondents were asked to say whether they were members of a trade union at the end of the questionnaire. 102 responses or 33.6% of those answering, replied in the affirmative. Thus two reasonable sub samples, members and non-members, were available for test.

None of the 25 showed any significant dependency between union members and non-union members at the 95% confidence level ($p < 0.05$). In general confirmation of the results already discussed there is no indication that trade union members view the application of computers in the hospitality industry differently to non-union members.

5.2 Attitudes and Ownership of a Business

Only 48 responses, 15.4% of those answering, owned all or part of the business which they managed. Valid sub-samples were therefore less available but the test was made in order to contrast results with those of both union members and the whole sample. Only three differences were identified over the 25 statements tested. Respectively, 3, 4 and 5 cells for each of these tests had expected values of less than 5. Under these circumstances, the chi-square is considered to be less accurate.

a) Owners were less likely to expect difficulties with subordinates than other managers, $X^2 = 17.56$, $df = 6$, $p < 0.05$. In effect there were
more neutral replies to this question by owners though the pattern of answers may suggest a greater sense of control by owners as opposed to other managers.

b) Perhaps predictably, owners were also less of the opinion that their boss did not believe that computers would improve business performance, $X^2 = 18.96, df = 6, p < 0.05$. Clearly owners would have more influence with colleagues and other owners.

c) Whilst owners did not differ from the general view of the effect of computers on hotel efficiency, they were more inclined to agree that companies which used computers were more efficient, $X^2 = 17.70, df = 6, p < 0.05$.

5.3 Attitudes and Sex

92 responses, 30.1% were received from women so that reasonable subsamples were available. Four statistically significant different results were obtained from the 25 statements.

a) Women were more strongly of the view that to use a computer you must learn a special computer language, $X^2 = 21.13, df = 6, p < 0.05$. In fact this result, in which there were no expected cell frequencies of less than 5, is significant at the 99% level. In this regard it would seem that female hospitality managers view computers as more difficult to use than males.

b) A second major difference, also significant at the 99% level is that female managers believe that society relies too heavily on computers, $X^2 = 20.23, df = 6, p < 0.05$. In this case, 1 cell had an expected frequency of less than 5. There is therefore a very strong indication that the views of the two sexes differ on these points.

c) Women hospitality managers also anticipate more difficulty with subordinates. Thus they were more inclined to the view that subordinates would not co-operate with a computer based system than their male counterparts, $X^2 = 16.45, df = 6, p < 0.05$. Although two cells had expected values of less than 5, this greater sense of
vulnerability is underlined by the fourth difference.

d) The statement that files on a computer could be wiped out unintentionally was accepted more strongly by female than by male hospitality managers, $X^2 = 15.43$, df = 6, $p < 0.05$. No cells had expected values of less than 5 in this instance.

Overall, whilst the views of male and female managers are similar, there does appear to be some indication that women managers feel slightly more alienated from computers than male managers. They anticipate less cooperation from subordinates and see greater potential problems in actual usage.

6 Summary of Main Findings from the Survey

The survey was conducted in order to assess the extent to which the data collected by cognitive mapping and by case studies was representative. To this end, comparisons were made with other surveys which had been carried out in three main areas. First, comparisons were made with two other surveys that had been conducted within the hospitality industry. Second, general comparisons were made with management surveys in the United Kingdom. Third, a specific comparison was made with a survey conducted in the USA which had been specifically designed to examine attitudes to computers by American professionals.

Direct comparisons between different surveys are always difficult unless the parameters of each situation are identical. Problems of intention, sample size, sample frame, investigation method, time and culture must be taken into account. Such conclusions as are made, have been drawn with due regard to these difficulties.

The method of investigation for this survey, consisting of a self completion postal questionnaire was far from ideal. The sample that was obtained tended to under represent women managers (under representation of women's views is a common problem for surveys) and to over represent the views of trade union members. There is also a predictable bias towards larger hotel and catering organisations.
Nevertheless, the response obtained was sufficiently large to provide a representative view of professional managers in the hospitality industry. Particularly in the hotel sector, these tend to be males of middle years with a low proportion of those who have undergone any higher education. Women managers are concentrated in the catering sector, particularly in welfare or employee feeding situations. These were well represented in the response. It seems reasonable to conclude that the sample obtained was statistically valid for the intended purpose.

6.1 The Attitudes of Hospitality Managers to Computers

The overall attitude of hospitality managers to computers is broadly positive, regarding the computer as an important business tool. In general it is viewed clinically and is attributed with few human qualities. The views expressed do not throw into doubt the results obtained from personal interviews.

There is no strong evidence to support the notion that general attitudes to computers vary according to educational level. Some differences were observed between attitudes of British hospitality managers and American professional managers but these are too small to support the case for significant difference.

Statements offered in context about innovation with computers did reveal significant differences between British managers and American professionals. The main finding of these statements is that British hospitality managers see themselves as the main limiting factor to the introduction of computer based procedures. Other possible inhibitors such as cost, the effect on jobs, opposition from bosses or unions and changes in the quality of work are not seen as important.

This view coincides with those obtained in other surveys conducted amongst senior British data processing managers and chief executives of top British companies. The difference between American and British statements may therefore be attributed to differences between environment, culture and possibly self awareness. The hospitality managers attribute their caution principally to a lack of training. This is matched elsewhere by the view that a lack of knowledge and differences between management...
expectations and information technology strategy, is a common problem for senior British managers.

There is some indication that women managers express a greater sense of alienation and anticipate greater difficulties from subordinates with computer based procedures than do their male counterparts.

It may therefore be concluded that the views of British hospitality managers and the management of computer based innovation in the hotel and catering industry do not differ markedly from those of British managers as a whole. Since the integration of planning systems and operating systems is more important in the hospitality industry than in some others, such concordance may be seen as problematic.

6.2 Applications of Computers and Information Technology within the Hospitality Industry

The primary orientation of computer applications in the hospitality industry is towards data processing, rather than management information systems. Even the predominant general purpose applications software in use is the clerically orientated word processor. The overall rate of computer penetration in the industry is low.

Microprocessor based control devices are most evident in electronic cash registers, though electronic alarm systems are also used quite extensively.

In terms of data processing, the three main areas of use are reservation and registration (front office) systems in hotels, stock control applications for catering and accounting functions for both sectors. Sector penetration is not equal though over the years penetration has taken place at an increasing rate. For larger hotels, the market for front office systems is almost saturated though further growth is expected in all sectors for food and beverage cost applications. Penetration in other operating areas is at a low level and patchy.

Average direct expenditure on computer hardware and software in 1984 had fallen to one third of its money value in 1980 at under £25,000 and there
is some evidence to suggest that the most frequent type of application is based on the use of more than one microcomputer. The industry would therefore seem to be moving in the direction of distributed networks of computers, albeit at a low rate.

General satisfaction with the service provided by the computer industry is quite acceptable, though managers are more impressed with the manufacturers' hardware than the systems houses' software. The main weakness on the supply side, reflecting attitudes as a whole, is seen to be suppliers' training.

6.3 Respondent profile and Contact with Computers

About two thirds of respondents to the survey were male. Overall, the managers who replied were in their mid to late 30s. They were mostly general or department managers. In common with the industry as a whole, their educational level was not exceptionally high being mainly qualified at higher diploma level or below.

The organisations which they managed were larger in terms of both turnover and number of employees than those of the industry average. However, this was not seen as a particular disadvantage since this particular sample, drawn from the ranks of the industry's management institute, was considered more representative of situations in which managers were likely to consider using computers.

In common with other managers, hospitality managers do not seem to have any formal mechanisms for scanning the external environment either in terms of developments by competitors or for flagging technical advances in the realms of information technology that may be of relevance to their own occupations.

Hotel and catering managers currently in post have generally received little or no formal training in the application of computers at an academic establishment. Though there is some evidence of personal development taking place in this area it is not widespread. However, although levels of computer utilisation are probably lower than those of managers as a whole, it is not exceptionally so given differences in the
level of education and the nature of formal training.
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P.R. Gamble
Managing the Introduction of Information Technology

"... it is not the technology which is the problem but the way in which it is introduced." (1)

So states a report from the heavy electrical machinery economic development council (EDC) following a visit to the United States in November 1984. The purpose of the study tour was to examine particularly the manpower aspects of the management of change surrounding the introduction of new technology. The quotation above refers to the implications of programmable automation, the consequences of which are quite substantial for a manufacturing organisation.

The study team observed that in some instances, "management were found to be a greater roadblock to the successful introduction of new technology [in this case robotics] than were hourly workers." Related to the findings of the previous chapter, it would appear that American manufacturing managers reflect more closely the attitudes of British hospitality managers than do American professional persons.

The report from the electrical machinery council's members identified several possible areas of concern surrounding the manpower implications of new technology. It appears that in the American companies visited, technological change was sometimes introduced piecemeal by engineers who informed their colleagues later. There were problems of co-ordination, responsibility was often concentrated on particular individuals or groups and whilst efforts were made to prepare the workplace, little was done to prepare the workforce.

In view of the potential equivalence between the impact of manufacturing automation on a factory and the impact of automated decision support systems in service industries, the lessons learned by the study group may be usefully considered in the present context. Parallels may be drawn between the role of the engineer in a factory in relation to the
technology of manufacture and the role of the hospitality manager in a hotel or catering organisation in relation to the technology of management information systems. Based on several case studies, the EDC offers a number of interesting guidelines pertinent to the introduction of new technology. Listed in no particular order (as the report says), these are given as follows.

i) Manage training for the introduction of programmable automation of management as well as for the shopfloor.

ii) Look to create motivation and a sense of ownership. The system must 'belong' to those who use it.

iii) Those using programmable automation must understand what is happening organisationally in a total sense.

iv) Programmable automation involves the management of people who are all decision makers at one level or another, rather than information collectors.

v) The probability of a computer taking the wrong decision is greater than that of a human being taking a wrong decision.

vi) In the process of change, the relationships between managers are very important.

vii) Recognise that management are not infallible and that no interest group has a monopoly of intelligence.

viii) Create an understanding of management by the workers; and of the workers by management.

ix) Create a dialogue between employee groups.

x) Strive for a unity of purpose in working for one goal; the security of one employee is the security of another.

xi) Tell the whole story so that employees understand the underlying
business reasons for change, such as the market prospects and opportunities.

xii) Create the time and opportunity for feedback.

xiii) Recognise the value of good common sense.

xiv) Recognise that success breeds success.

xv) Recognise at the outset that people will resist change.

xvi) Create the organisational means for securing change and special units to see specific projects through to their conclusion.

xvii) Explain what happens if change does not take place. (2)

Clearly, the EDC is taking a broadly based view to technological innovation and, with the exception of point xv) is taking what McGregor (3) labelled as a theory Y approach. In sum, this assumes that differences between the motivational stance of employees and managers stem largely from management style. Each individual is seen as having the same potential though situations, experience, and perception may place some people in opposition to management. The theory argues that employees who are treated as well motivated individuals, willing to take responsibility for their own actions, able to manage their own tasks, will respond positively. By contrast a theory X manager assumes what Herzberg (4) referred to more graphically as a KITA ("kick in the ass") approach. Employees are taken as unintelligent and lazy, to be controlled by prodding and punishments.

The value of a theory Y approach to the introduction of information technology (IT) is widely shared. For example, Professor Igor Aleksander, head of the Kobler Unit for the Management of Information Technology at Imperial College London, offers a seven point plan for the successful implementation of IT. His recommendations coincide closely with those of the EDC and are paraphrased below. (5)

a) Introducing IT is the prime concern of senior executives, not just
data processing specialists or consultants.

b) Senior executives must seek an involvement for further development from the entire organisation since IT implies an organisational change that will affect everyone.

c) The individual nature of each organisation must be recognised.

d) A phased introduction is highly recommended.

e) The explicit potential of the firm or organisation must be identified. It is a mistake to introduce an IT application merely because it is available in the market place.

f) The constructs of the framework for introduction should be one step removed from the costs of personnel, documentation and space. Thus relationships with customers, the balance of work and the value added benefits of the system are more important.

g) If the benefits of IT cannot be measured they may not exist. The introduction of new technology must be planned on the basis of what can be measured.

1.1 The Case for Case Studies

The third methodology selected for analysis of the nature of hospitality managers' behaviour in computer innovation was selected as the case study. There are several reasons for this choice. Whilst, as Jackson and Keys have pointed out (6), a number of systems based, problem solving methodologies are available it is important to choose a method suited to the context of the problem. From the analysis of constructs in chapter 3, it is apparent that many of the values held by senior managers are vague and undirected. Since the role of a hospitality manager is pluralist, that is, encompassing several systems it is likely that the manager as decision maker will see problems from a number of different perspectives.

A potentially attractive methodology for exploring this situation is the "soft systems" approach devised by Checkland (7). Checkland provides a
helpful workbook designed to facilitate documentation of the feelings and expectations of the client, the decision taker and the problem owner so as to guide considerations of the match between problem contexts and problem solving systems. However, where each of these three roles is embodied in one and the same person, and where the problem situation is both complex and ill structured, as appears to obtain in hospitality management, then the workbook is less useful. In an investigation of a travel agency, Lim and Jackson (8) found the workbook to be of limited value under such conditions though they acknowledge the contribution of Checkland’s approach as a form of action research.

This thesis has taken as its basic premise that the introduction of computers into the hospitality industry is related three types of change. The primary change is that of management attitudes and values. This may then be supported by structural and procedural changes in the organisation. When these ideas were explored in chapter 4, it was evident from the literature that there is a confusion between issues to do with adopting computers and issues to do with using computers for decision making. Such issues are particularly hard to isolate discretely in hospitality organisations where operational and management systems are perforce integrated. A hotel front office system both processes reservations and generates the market and management information necessary for planning and control.

In considering a number of studies into the effects of computers on management structure, Robey (9) identified several difficulties in assessing the overall dimensions of change. Perceptual bias by interviewees, in which managers appear to disregard effects which are unacceptable to themselves is one problem. Another is the practicability of developing criteria for measuring the effectiveness of the emergent organisation structure. However, most importantly, since the number of functions which a computer can perform is widespread, attempts to relate overall levels of computer use to other aspects of organisations are fraught with shortcomings. In these circumstances, Robey concludes that case study methods are most effective. They permit detailed elaboration of the type of application, the particular functions affected and the structural effects felt in different areas.
A case study method has therefore been adopted here to allow for a closer exploration of the topic. The constructs held by managers about computers will be examined and their approach to innovation discussed. A total of six organisations have been studied in depth, three hotels and three catering organisations which are reported in the next chapter. Examples have been selected to include situations of both successful and unsuccessful technological innovation.

The data were elicited in two interviews, fixed by appointment. In the first the data for a cognitive map was obtained. These data are reproduced fully in appendix 8. Although the data analysis was available for the second interview, counselling was not considered to be part of the "contract" between the manager and the interviewer when the appointments were made. It was not considered appropriate therefore to use the second interview for feedback on the nature of the grid. Instead, using the pro-forma outline included in appendix 9, a conversation was conducted which examined managers' expectations about computer technology, the nature of the systems supported, the method by which they were introduced, the way in which change was introduced and the structural effects on the organisation and work groups. Some assessments of the process were also sought.

For the detailed studies, large hotels were chosen since these would have ample resources to deploy computerised systems if desired. It was also necessary to select units in which the general manager had the discretion to implement systems of his or her choosing. A hotel belonging to a company which imposed systems centrally or which required central office authorisation for relatively small capital expenditures such as those associated with microcomputers was not considered suitable. In that situation the innovation decision is influenced "at one stage removed" from the person who has to live with it.

The three cases reflect a hotel that is considering a major extension of its computing resources, a hotel that has had an extremely unsuccessful implementation which had to be replaced and a hotel with a long history of computer usage over a wide range of applications. In all three cases the general manager has a great deal of autonomy and would be a major influence on the systems used.
Case Study 1 - Prior to Implementation

Case study 1 was undertaken at a 260 bedroom, three star, airport hotel. The annual turnover is approximately £4.5 million and is based on an occupancy of 85% with an average length of stay of 1.2 nights. The hotel employs 160 people though it considers itself to be short staffed. The unit was constructed in the early 1970s and opened in June 1978. Two years after opening, in December 1980, it was acquired by the present operating company a major, international consortia. Despite being part of a large group, unit managers have a large degree of autonomy. The general manager explained his situation as follows.

"It is very difficult to say what is a standard XXX hotel because most of our growth has been through acquisition. Basically we are very decentralised with a tremendous amount of autonomy for the managers. Basically, my responsibility is to run this business for XXX hotels - it's almost as if I had a franchise on it. Therefore, the degree of latitude given to me in resources, not necessarily pure finance because they have to agree given profit targets for the year, it's down to me what is then achieved. There is a lot of latitude in what I can and can't do. I don't have to go back every 5 minutes and say, 'is it alright?'"

Thus although the hotel is part of an international chain, with considerable financial resources, the role of the general manager is important. It imparts character more definitively than would be the case were the hotel part of a more centralised group. The general manager also has more discretion than many of his counterparts in other major, international chains. For example, the manager can actually influence the nature of the product which would not be possible for a more heavily branded product. In this particular situation the manager has altered the configuration of food and beverage facilities by adding a coffee shop to the hotel restaurant. He has initiated and even (with approval) obtained the finance for an £860,000 leisure centre to be opened in late 1986.

2.1 The Background of Computer Usage

The hotel itself has a substantial turnover and is therefore well able to
afford to purchase computer systems should it choose to do so. The scale of its operation is also such that given its size and market situation, it is unusual in not possessing any major computer systems at the moment. In this respect the unit is unusual even within its own group. Its sister hotels all over the world are almost all computerised and the manager believes his hotel to be the only one in the group that is not. A process of investigation and evaluation is currently under way.

The systems that the hotel now uses are those which were in place when the hotel was taken over. The most important of these is an NCR 8250 series accounting machine which had been installed by the previous owners just prior to the hotel opening in 1978. This drives the entire accounting system, sales ledger, bought ledger, nominal ledger and payroll. It cost £50,000 to buy and its maintenance cost is in the order of £6,000 to £8,000 per annum. As the manager observed,

"It’s interesting isn’t it that £50K investment that time ago could now be between £6K and £8K? We could redo the whole lot, gather back a room which it is now in because it [the replacement] can sit on top of the desk and have twice the megabytes. And in fact, [based on] our investment now, it will cost us less to buy it than it actually costs us to maintain the existing system."

The front office billing machines are also NCR 250 series, electro mechanical devices (not microprocessor driven), linked on a master/slave basis. These are connected to some NCR 250 point of sale machines in operating departments. The machines are now 8 years old and represent one of only 5 remaining UK sites where NCR have these machines. The equipment has now run beyond its expected life and well beyond its design limits. The billing machines, designed for the retail market where they would be operated for 8 hours per day are being driven for 16 hours per day, 365 days a year in the hotel. They have been repaired so often that they have "effectively been rebuilt". They are thus both obsolete and worn out, in fact there is a failure of one of the 250s on average once every two days.

Whilst the accounting machine itself is in better shape, the installation is so old that NCR will no longer maintain the accounting software. Whilst the billing machines have to be replaced soon, the financial
controller estimates that the 8250 will last "not more than 2 years". The need for replacements of some kind in the accounting/billing area is therefore being forced on the hotel.

There are other operational pressures in the front office, "in the real sense, our biggest single area of problems is reservations." Airport hotels present somewhat unusual marketing problems in which market segmentation and regulation can be very important, especially in conditions of high room occupancy. The annual occupancy of 85% is supported by 8 full months and 4 off peak months. The manager does not see further revenue or profit gains to be made through higher occupancy. Profit will be improved by achieving a higher room rate (price).

The term 'achieve' is carefully chosen. There is no intention to raise published prices beyond "selective, inflation based, increases". Higher rates will be achieved by altering the pattern of market segmentation. Principally this means a shift away from heavily discounted sources of business, such as tour groups or aircrew contracts towards other, more profitable segments. The XXX actually establishes targets and monitors 13 market segments. From an operational point of view, there are dangers in working with so many segments as the manager realises. However, the marketing shift is also important in other terms.

The airport hotel market in which this unit competes has matured steadily over the years. In the 1960s the hotel supply was provided by independent companies. As the market grew, first national then international chains were attracted to the area. The current provision of 2,000 first class rooms is forecast to increase to over 3,000 by 1992. Already other major, international companies are represented and a combination of extensions and new operators will lead to a major increase in supply. Under these circumstances of competition, XXX has no desire to be pushed into a price war for bulk business and has identified its major objective as holding market share.

The implications of this for the front office systems are important. As the mix of business changes, the volume of transactions handled by the reservations department will increase. With group bookings or contracts, large numbers of rooms are sold in a single transaction. This is not the
case for other market segments. The existing procedures could not cope with volume increases.

"How busy are we depends on how many bulldog clips we've got on the wall, you may laugh about it but when we're busy we're off the racks and onto bulldog clips. If you want to check a reservation you have to take the bulldog clips down and go through them by hand. . . . We're not sure that we will be able to cope. We're worried about overload and we're worried about paper in relation to our mix. As our mix gets more individually related we're going to generate a hell of a lot more paper for not necessarily any more occupancy. We saw that last year. We had our first big mix change last year and we actually ended up doing 2 or 3 percent more than the year before but we must have had 50 percent more paper. We did increase the Manning level, we supplemented it with two casuals and the error factor started to increase."

The hotel is therefore confronted with a need to change its systems in two ways. First, its existing systems are obsolete, worn out and will need replacement anyway. Second, changes in the marketing position require increases in capacity and sophistication for the reservation systems. It will be recalled from the discussion of chapter 4, that Mintzberg (10) offers a scale for categorising decision stimuli. This ranges from opportunity decisions of a voluntary nature, through problem decisions stimulated by mild pressure to crisis decisions in which managers respond to intense pressure. On such a scale, the XXX hotel is considering computerisation in a problem-crisis situation.

At the moment, the hotel operates only two small microcomputers. It is interesting to examine the conditions under which each was acquired. The first of these is an Apple IIe. It had been purchased about 18 months to 2 years previously by the chief accountant, along with a spreadsheet package called Multiplan. The reason for the purchase, given by the general manager was as follows.

"Basically, we got ourselves to a point where the demands on us and the work load was so high we had to say we can't physically cope with it any more, manually or semi-manually. We have always in the past produced 10 day forecasts and budgets manually. Now the whole shooting match, forecasts, budgets, payroll control, annual budgets, monthly
The decision was of the problem-crisis type. The computer was purchased by the chief accountant because he could no longer cope with the existing work load. It might also be worth noting the nature of the innovation itself. The Apple IIe is based on a technology that dates back to 1976. By 1984 it had been superseded by other Apple computers. The IIe is a well known make of small computer, extremely successful in its day for educational and home use but it would not now be considered ideal for a substantial business application. It is also quite inexpensive, especially in relation to the turnover of the hotel. In terms of a first step it is therefore somewhat tentative.

The results appear to have surprised the general manager.

"What we've done in fact because we've suddenly got this [we've] said, 'hey, there's a whole big world out here'. Using Multiplan we've built up a complete business system totally on the Apple and moved the Apple in with the food and beverage controller. And then we bought an Apricot which was more powerful and moved everything we had on the Apple onto the Apricot."

The Apricot seems to have been purchased in response to yet another crisis. It appears that at the end of 1984 the hotel "lost" both its food and beverage control clerks. The statistics they were producing "weren't worth the paper they were printed on", and some means was required of maintaining control information.

"Looking back, I don't know where we would have been without them... We really bought the two PCs as a result of a crisis and said, '*****, this is powerful stuff'."

The Apricot PC is a more expensive, powerful machine than the IIe, more representative of what might be considered a small, business computer capable of sustaining an important operating system. As technology it was more up to date in 1985 than the IIe. It is therefore significant that the IIe was switched over to a disk intensive system such as food and beverage control, where continuity of operations and currency of
information is important. While the more sophisticated Apricot was retained by the financial controller for planning and management information.

Despite reservations expressed here, the food and beverage system appears to have been a great success in corporate terms. The XXX was able to sell the system to a sister hotel in New York city which has 1,762 bedrooms, banqueting for 8,000 and substantial food and beverage turnover. This has clearly delighted the general manager.

"Suddenly, our expectations and realisation of what computers can do for us, but more importantly I think, the big essence is we got the right information at the right time . . . enabling us to make quality decisions based on sound figures."

2.2 The Attitude of the General Manager

The general manager of XXX is a man in his mid to late thirties. His approach to the interview was relaxed and confident. Answers to questions were given thoughtfully and at length. He clearly likes to deal with people directly. His office is not large and can only be reached via that of his secretary but his desk is set against the wall. At the front of the office is a small table at which 2 or 3 people can sit side by side. He moves away from his desk for discussions and during the course of the interviews there were no interruptions.

He described his style of management as informal, staff including himself address each other by first names. It appears from the discussion that he uses and takes note of a management team consisting of 4 other senior executives, the financial controller, the food and beverage manager, the marketing and sales manager and the personnel manager. There is no rooms division manager in the hotel which is significant in view of the importance of room sales. It implies more direct involvement from the general manager. However, the front office manager is given special consideration.

The general manager himself was promoted from food and beverage manager of another airport hotel in the same company. When he joined hotel XXX in
1980, it was losing money. Within 2 years the general manager had changed its position. The hotel itself is now one of the most profitable in the entire group. As a measure of this, the company has invested over £2 million in XXX over the period 1984 to 1986. The manager is therefore held in high regard by his company. In recent months he has been offered the job of managing the company's New York hotel at an annual salary in excess of $100,000 and has been approached by another UK company for a similar substantial appointment in London. He has every reason to feel secure and confident. The circumstances are such that decisions which he might make in the area of computerisation will be both approved and supported corporately.

2.21 Knowledge of Computers and Scanning Mechanisms

The general manager of XXX claims little background knowledge of computers. He explained that the financial controller has used them before and this is why the latter was the primary initiator of purchasing the microcomputers. A conditioning factor may also be noted in that the previous hotel for which this general manager had worked for several years, used as case study 2, had extensive and unsuccessful experience of computer applications.

The manager himself holds a higher diploma in hotel and catering management. He appears to have undertaken no further formal education since leaving college. Although he has taken part in several company training seminars though none of these have been about computers. The financial controller who is an important actor in the purchase decision for the replacement systems has equally little formal training relevant to information technology and has also attended no courses or seminars. The general manager described a number of scanning mechanisms by which he keeps himself informed.

The most important of these appear to be an involvement in the local community. He actively encourages his managers to join local business community organisations. He himself serves as a governor on two local technical colleges, is chairman of the local hotels association and serves on the south-east England tourist board. He believes that this keeps him in touch with the academic world, gives him a broad perspective of tourism.

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developments in the south east and allows him to discuss with his peers, "marketing and systems concepts" which are of interest.

He also subscribes to a "broad but selective section of the media" but he expects his sales and marketing department to monitor these "for research" and expects his financial controller to keep in touch with computers. Corporately, the organisation is in the habit of circulating spasmodic proposals to general managers for comment rather than for information. The general manager regards such documents as a healthy example of his company's consultative management style. However, the reports cannot be regarded as market or technical intelligence briefings.

There are no scanning procedures that will systematically inform him of developments in business computing relevant to his hotel. The pattern described here conforms to that which emerged from the survey analysis in chapter 6. Whilst the general manager has initiated procedures to keep himself informed, these are not especially directed at technology in general or information technology in particular.

2.22 Grid Elicitation

The process of grid elicitation threw further light on the management style. The general manager gave an exposition of his business planning strategy in a way that would not disgrace a formal seminar. He appears to adopt a position wholly appropriate to a general manager by concentrating on the management of the strategic position of the hotel. Thus he is concerned with the development of 5 year marketing plans which are then supported by a series of 1 year plans. From his 5 year marketing plan he then identifies the hotel's product requirements and consequently its needs in terms of capital, human resources and operating systems.

Once these plans are agreed within the unit, the manager then has to "sell" them to his head office. This he perceives in terms of quality of information.

"They are not difficult to sell. Given quality of information, quality of projection and some sound research it is not too difficult to reach sound conclusions."

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In terms of tactical orientation, the general manager then interprets his role as "that of a policeman" to make sure that the hotel stays with the plan.

"If we have made a decision as a team that we are going to go down this road and we have got that agreement financially and from a marketing strategy point of view, I just want to make sure that when we design menus we are not over there when we said we were going to be over here."

The examples of decisions that he offered were therefore principally of a strategic character.

2.23 Definition of technology.

The thrust of the general manager's perceptions seem to be towards quality of information.

"Technology as I see it, is evaluating the use of new hardware or software that will enable us to provide better quality information, to enable managers to make the right decision at the right time and thus enable us to operate the business along the lines we want it to. I don't want technology to take over running the business, I want people to continue running the business but I am aware that in a lot of instances we don't have the right information at the right time. Therefore there is a risk that the quality of decision will be suspect because the quality of the information on which it is based is suspect."

When asked if he perceived technology entirely in terms of computers, the manager expanded his definition to include other operational systems such as telephones which are also machine based. However, he concluded,

"Technology could even be literally thought processes. We've got a young management team here. The average age is under 30. They come from a very wide background and it is interesting how they apply their thinking. One of the reasons that it [computerisation] could be an exciting development here is that we as a company are not run by manuals."
2.24 Grid Analysis

Figure 29 shows the grid analysis for the general manager of hotel XXX. It will be observed that the orientation of the constructs seems to run along a pole between formative processes in the sense of ends and evaluative processes in the sense of means. These are very much focused on information processing. Thus the most closely grouped constructs are,

FORMATIVE, LESS STRUCTURED and NOT SPECIFIC

where the term structured implied that it had been checked. These are then linked in to,

GETTING INFORMATION and COMPILES (information)

which are then are related at the same level to,

PROCESSES INFORMATION and GIVES DIRECTION.

AD HOC procedures (of which an example was telephoning a local authority to get planning information) is not related closely to the other constructs. Noticeably, with the exception of AD HOC, all these constructs are tightly related and not highly differentiated.

The technology itself falls into two groups. One group, which falls towards the poles described above is,

EXTERNAL DISCUSSION, FILES linked to TELEPHONE and STREET SMARTS.

STREET SMARTS refers to informal conversations with peers. The other group, which includes the small computer is construed as being more specific, trusted, evaluative and giving status information.

SMALL COMPUTER and FINANCIAL REPORTS, CALCULATORS, as a set somewhat distinct from

MARKET INFORMATION ANALYSIS and INTERNAL DISCUSSIONS, ONE : ONE MEETINGS and STUDY REPORTS.
Prior to Computerisation - Manager 10
The General Manager of Hotel XXX
Cluster Analysis of Grid by Program MONOCLE

Cluster Presentation of Grid
Subject 10 - 04.86

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Directions
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- 6
- 6
- 6

Processes
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- 1
- 4
- 4

Compiles
- 1
- 1

Get info
- 4
- 4

Less struc
- 2
- 2

Formative
- 3
- 3

Not spec
- 7
- 7

Ad hoc
- 8
- 8

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Perhaps due to the influence of the financial controller there is a strong link between the small computer and the financial reports. It is interesting also to note the connection with calculators, which the manager said he does not use very often. Market information reports analysing segmentation, internal discussions and one to one meetings with other managers are probably important to the style of this manager. It is significant that the computer set is not closely related to these decision processes. Within each set, elements are tightly related and are not highly differentiated.

2.25 Grid Evaluation

In the light of more information, the analysis offered by the grid can be evaluated more fully. Results are encouraging. This manager seems to operate by defining a strategic framework and then monitoring tactical decisions within that framework. The chosen strategy is the phased mix change between now and 1990. This corresponds to a pattern of construing which takes a means–end orientation. Possibly conditioned by previous experience, his approach to computerisation is indirect, through his financial controller. Caution is reflected in the method by which the Apricot was acquired, leasing, and the terms in which he justifies it to himself.

"At the end of the day, it [the Apricot] ended up costing us less than half an employee a week, something like £20 per week. Where am I going to get that resource for £20 per week?"

The computer is construed as a device closely linked to the financial reports which it is used to produce and which the general manager sees. It is not linked into the important, formative decision processes by which the manager chooses future strategy. It is linked into the evaluative processes that identify what has already happened. There is some tightness about the construing which is probably associated with a freezing of the pattern prior to making a decision. It is not the tightness of a defensive or hostile manager such as subject 11.
The key orientation of this manager is towards what he describes as the quality of decisions which may be improved because information is available at the right time. He has a mature view of the potential role of the computer in this regard.

"The development of systems and procedures within the building is basically down to us [the management team]. . . . There can be a risk when one is exposed to the brave new world. When you come on to talk about an evaluation process of where you are, suddenly one wants 20 cubits (sic) of information when one was quite happy to work with 6 before. Why do you need any more than 6? You can get overload."

The problem which he perceives in this regard is not so much the training and education of new managers but the retraining of managers of "his generation", the 30 to 40 year old managers who have not worked with computers before. If hotels and leisure are meant to be "THE industry by the year 2,000 then a lot has got to happen".

There is a people orientation very similar to that expressed by some of the other hotel managers. For example, the long, historical perspective of the unchanging role of the hotel, taken by mid-computer manager 6 interviewed in Malaysia, is echoed here.

"The best thing a guest can say to me is - how the hell do you do all this without a computer? That is my worry, that staff will lose the edge in welcoming the customer. At the end of the day when they [computers] are there, they're there to help us. The guest couldn't care less. What the guest is looking for is the same, he's not looking for any more or any less. He wants a welcome, he wants a smile, he wants the hotel to be efficient and he wants his bill correct. Computers are for us not for him. There is a "risk" in evaluating hotels, the more computerised you are, the greater the risk that you just become a person in the system."
manager 11. In common with manager 12, he doesn't want staff to hide behind the computer, "the first member of staff to tell a guest, 'you're not in my computer', gets fired." The clinical, depersonalised, inhuman, aspects of computers that emerged from the analysis of adjectives in the survey is clearly a matter of concern to hotels. This manager does not see the computer as a device for enhancing service, nor really acting within the decision process. It is a work horse that deals with the clerical aspects of reservations and delivers the "right" information to a decision maker.

2.3 The Nature of the Innovation Decision Process

The nature of the decision process was explored in a discussion with the general manager and the financial controller. The latter, a cost and management accountant, whilst having no formal training in the use and application of computers is clearly the prime mover in seeking out and appraising potential systems.

2.3.1 The Nature of the Problem

The hotel appears to be faced with three problems.

a) Changes in marketing strategy will lead to major increases in workload, especially for reservations. Coupled with this is an associated requirement for better management information for planning and control.

b) Existing manual procedures are already experiencing difficulty in processing the volume of paper associated with changes in the pattern of business.

c) The electro-mechanical billing machines fail with increasing regularity. It is anticipated that the minicomputer used for the main accounts cannot continue for more than 2 years.

These problems appear to be widely accepted and understood in the hotel. They have been recognised by both senior executives for "about 18 months to two years".
The reason why nothing has been done before are complex and not easy to understand. The explanation given was that of capital expense. Clearly at one level this bears objective examination. The hotel has spent a great deal of money over the last two years renovating rooms and constructing a leisure centre. However, in the context of £2 million of investment the purchase of computer systems would be relatively small.

There does appear to be a great deal of caution in the way in which computers are introduced, coupled with a certain perspective on the expenditure of relatively small sums. Both the Apple IIe and Apricot PC are leased for £17 and £20 per week respectively. The turnover of the hotel is approximately £12,300 per day or about £8.5 per minute. In such a situation, many managers would have purchased outright devices costing as little as £1,500.

It seems that there is no strong drive towards computerisation. As a corporate procedure, the hotel is obliged to produce a detailed marketing and profit plan each year. This was originally resourced by a contract with a computer bureau which cost £3,000 each year. One of the first acts of the management team was to cancel this contract and produce the plan by hand, thus saving £3,000. The Apple IIe seems to have been an outcome of such a salutary experience. However, one additional by-product of the corporate planning process is that the general manager has a very clear idea of the management information that he requires for his corporate planning. These data are not being generated by the computer systems that have been examined so far.

Finally, although the hotel is experiencing staff recruitment problems, neither of the two chief executives associate labour turnover with the existing manual procedures, though they acknowledge that, "people are beginning not to trust the existing machines."

2.32 The Search Procedure

Perhaps the most surprising aspect of the search procedure is its lack of formal structure. The hotel is expecting to spend about £130,000 for billing and accounting machines and a further £60,000 or £70,000 on a
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front office system.

The search procedure conforms very closely to the informal process identified by Mintzberg et al. In chapter 4 it was also noted that both Pettigrew (11) and Cyert (12) have described problem solving as a kind of mating process in which desired solutions are matched to problems. This appears to obtain here.

At this stage, no formal systems analysis has been carried out by either manager. No consultants have been retained to analyse the technical requirements of the hotel. There is no explicit understanding of what the system will do or how it will be evaluated. "We are looking for 80p to £1 on the rate", was the comment obtained. Obviously, the effects of inflation will give the hotel such an increase in due course.

In view of the lack of technical background of both managers, the search is being conducted in conditions of considerable ignorance. Even though an expenditure of some £200,000 is being contemplated, technical advice is not being sought. The reason given is that of the expense of consultants.

Although the general manager presents the problem as being open, for which no particular solution is preordained, it is apparent that a computer based solution is highly likely. Indeed, on close examination the potential solution to the systems difficulties has been narrowed quite considerably. There is strong peer group pressure. Not only is the XXX the only hotel in the group without a computer it is the only major hotel at that airport without a computer.

The notion of specifying and commissioning a system from scratch has not been seriously considered. The search has been narrowed, almost from the beginning, to one of the five types of system used by the other hotels in the group. This has been restricted even further to three possible suppliers. Two of these have been used by the XXX hotel's UK sister hotel and the third has been used by the group's chief executive at a former hotel operated by the company. That none of these hotels may be exactly comparable to the XXX has not been allowed to colour the perception of these solutions. Even more startling is the fact that one favoured supplier was associated with a disastrous systems failure in the sister
hotel followed, by successful legal action for redress.

The systems are being appraised on the basis of visits by the financial controller and front office manager to demonstrations by suppliers. There are no technical standards for measuring performance and there is no formal list of system requirements. When pressed to explain how the important issue of response times would be judged, both managers took comfort from the performance of the systems in other hotels. Thus the fact that they were the smallest hotel in the group meant that any system which could successfully support hotels 2 or 3 times bigger was taken as a satisfactory measure of acceptability.

Whilst this may undoubtedly be true it mitigates against finding maximal solutions. It is evident that both managers are confusing systems that may be processor or disk bound with those that are print bound. Quite possibly, a microcomputer solution linked to very fast printers, could cope with a the maximum checkout of 200 per hour. This solution might be £50,000 cheaper than those presently under consideration. However, it is apparent that the general manager is reluctant to press a case for a system not already in use within the group.

2.33 Staff Involvement, Consultation and Training

Staff in the hotel are not unionised. There has been no staff consultation, though the intention to install computers has been discussed with the staff association where the reaction was said to be positive. The purchase decision is being dealt with by 2 or 3 senior executives and only the financial controller and the front office manager have actually looked at systems. The decision is not seen as one which would either threaten or unduly concern the staff who will be affected. No staff cuts are anticipated not even in night audit functions. There is no intention to use the system change as an occasion for introducing other organisational changes.

No special difficulties are anticipated with implementation of the new system and no special provision is being made for advance training. The XXX "may borrow the DP manager from the YYY for a few months to help with installation." All the new systems will go live together. There will be
Such an approach contrasts markedly with that of manager 12. In case study 3, system changes are viewed holistically in terms of the organisation. There is extensive staff involvement, widespread management involvement in system selection and design, pre-training prior to installation and a constant commitment to organic self development.

2.34 Management Expectations

"I don't think it will change the way we look at our business. I don't think it will change the decisions by which we gear the business. Some of the mechanical aspects will change but in essence, if anything, we are looking for something which will give us the same information we get right now plus added bits that are a chore to get. And making sure we get the information when we should need it to make the decision. We're hoping the computer will do that."

The general manager has a very clear understanding of the management information which he wants for decision making. He personally maintains detailed statistical records of business over his period of office. Sheets of paper covered in personally, hand written numbers, colour coded to denote important elements, are readily available in his office. These data are all extracted from other management reports. The general manager explained that by extracting and recording the data himself, he maintained his "feel" for the business. It is interesting to observe that all three general managers were using hand written reports in similar ways.

His concerns about the computer systems that he has encountered are several. He is worried about information overload. He does not want to have to wade through pages of printout. He is concerned about systems design. "Somebody has made assumptions about what hotels want and you have to take what is offered." He cannot find a system on the market that will give him the statistics that he now obtains by hand. He cannot find a system that will actually help him make accept/refuse decisions. He wants a system that will actually help the hotel to manage its segmentation pattern. There is a very clear understanding of how the information should be used. He wants to move from a reactive to a...
proactive situation.

"I want a food and beverage controller reacting to information, not generating information. If I’m going to save money on food costs I will find it around the operation. I won’t find it sitting in the office."

From what the manager is saying, a sense of personal threat may be discerned. Whilst the manager does not envisage a computer helping with the decisions he has to make, he is more sanguine if other people are 'controlled' by the machine. However, there is also an admission that the small adventures with the microcomputers have made an inordinate impression due to the clumsiness of the existing procedures. The shift in management activity from adding up numbers to interpreting data has already made a noticeable impact.

These two small systems have been specifically tailored in-house on a spreadsheet to meet well identified information requirements. Yet the lesson does not appear to have been absorbed. Both managers seem resigned to using sub-optimal, standard systems. Neither the general manager nor the financial controller have been impressed by the computer based hotel systems that they have seen. The financial controller commented,

"To be honest, I’m a bit disillusioned really. Basically it [the computer] doesn’t do very much more than we’re doing at the moment."

To which the general manager added,

"It’s a significant investment for not a great value added package."

There are expectations that installation of computers will make it easier to recruit some kinds of staff, especially in the front office. However, there do not seem to be any anticipated benefits either in terms of the service product for guests or in terms of management decision making.
2.4 Summary of Main Findings

The XXX hotel is a substantial and profitable business. Both its financial and operational circumstances could justify the use of computer based procedures. The manager has avoided dealing with issues to do with computers until forced to do so in a crisis situation.

The representation of the problem environment has occurred in such a way as to mitigate against an outcome that will greatly affect management decision taking. Despite a cognitive organisation that focuses on formative processes and evaluative processes, and a predisposition to organise and use both hard and soft data in a sophisticated way, the perspective of the computer is that of an historically orientated, evaluative device. This may be interpreted as a form of psychological defence against the threat which computers are imagined to pose.

The manager's perceptions are reinforced by the early selection of solutions in the problem solving process. Although a formal specification of information requirements and performance standards could be drawn up, this has not been done. The problem has been defined not in terms of the extent to which management information needs can be better supported by a computer based procedure. Instead it has been defined in terms of choosing one of only three systems already used in the company. Choice will probably fall not on the best system for the job but simply on the least unacceptable (and the least threatening).

In consequence, computers have been categorised as fast, numerical calculators, "number crunchers" of no importance or potential in organisational terms. They are seen as purely mechanical devices. Little impact is sought or anticipated for either guests or staff. Many potential attributes of the device have been disregarded. Once the computer is conceived with such a limited perspective many complex issues can be avoided. The complexity of selection, purchase and implementation is minimised. The whole issue is being treated very narrowly. The general manager has consigned the process to his accountant since the machine is construed only as a large billing and accounting system.

Following the effects of the two small microcomputer applications, it
seems probable that these views will change markedly after new computer systems are installed. Such managers will indeed demand more from their computer systems than the systems designs are likely to be able to deliver. Objectives in terms of quality of information, rationalised as important to the general manager but not central to the decision process for selecting a computer system, will be reactivated. This may lead to both frustration and disillusionment.

Case Study 2 - Replacement of Unsuccessful Innovation with Computers

The second case study was undertaken at hotel YYY, a sister hotel to that in case study 1. Hotel YYY is located at another major international airport and therefore shares some operational characteristics with hotel XXX but the policies of the two hotels were not linked. Since each unit in the company frames its own style within a loose corporate structure, the influence and discretion of the general manager is extensive.

Hotel YYY has approximately 670 bedrooms and employs 480 staff. The hotel contains a leisure centre with its own swimming pool and offers extensive conference and banqueting facilities which include a 250 seat theatre with sophisticated television and communications. The annual turnover was about £11 million in 1985. In 1986 it was voted best airport hotel in the world by an international travel magazine.

Operationally, Hotel YYY has something of a chequered history. Shortly following a change in ownership, it was opened hurriedly in March 1973 to comply with a government incentive scheme for new hotels. Many aspects of the physical design were inadequate and few operational procedures were adequately documented or resourced. It opened in an area which is difficult to access by road from local residential areas and in a labour market where competition for unskilled labour is severe. It also opened in a market which was over supplied with hotel accommodation as a result of the government scheme. The opening parent company had little experience as a hotel operator.

These factors combined with unfavourable leasing terms to give the hotel a very unstable operating environment during its first few years. Market conditions and poor product quality forced it to take a high proportion of
low rate group business. Difficult working conditions exacerbated labour turnover. Air crew contracts were associated with frequent complaints as air crew unions fought politically to have their members accommodated in the city 45 minutes driving time away. Not only would this have offered the crew a more diverting area in which to relax but would have given them 45 minutes more flight pay. The parent company alternated senior managers between those with and those without a hotel background. Just as an inexperienced general manager had learned how to do his job after eighteen months or so, he would be rotated back to a division of the company where he was more able to perform.

Thus by December 1980, when the hotel was acquired by its present operator, it had a poor track record of profitability and product quality. The new holding company was a hotel company which recognised and valued the contribution of specialist hotel expertise. The present general manager rejoined the hotel in 1983. He had some earlier association with the hotel, having previously worked there for several years, first as banqueting manager and then as food and beverage manager. He was recruited back from a position as general manager of a central London, luxury hotel.

The background of this manager is very traditional in the hotel industry. He comes from a family which has been managing hotels for 150 years. Following a diploma course in hotel and catering, he has "worked his way up" with experience as a department then divisional manager in both rooms and food and beverage. He has a leaning towards the traditional, somewhat formal style of operating hotels in which the manager wears a morning suit.

3.1 The Background of Computer Usage

No computer systems of any kind were installed on opening. Even the accounting system was largely manually operated with only an NCR 250 series to keep track of the main ledgers. The huge volume of paper associated with a paper audit trail was all processed by hand and kept in a filing system based on plastic bin sacks. The use of obsolete NCR 42 electro-mechanical, front office billing machines was another problem area. The NCR 42 was, even in 1973, at the end of its product life. It
is a complex machine to use. To train an operator properly takes six weeks. Of the four machines set up to deal with guest bills, only three could ever be counted on as functional and during a large checkout one or more these might fail as the machines worked beyond their design limits.

The conditions in a very large airport hotel are such that to operate the unit manually requires well defined procedures and a highly trained staff. Neither were available. Occupancy can fluctuate widely in airport hotels if flights at the nearby airport are delayed or rescheduled. Average length of stay is very short, slightly over 1 day, so that from a full hotel the morning checkout can involve as many as 600 departures all of whom are anxious to catch their flight. In addition, there were no direct links between operated departments and the cashiers. Guest charges were transmitted via an erratic pneumatic tube system. Conditions in the front office were often chaotic.

Physical size itself was a problem. The distance from one end of the hotel to the other, and back was almost half a mile. Thus an in-room vending system for food and beverage had been retrofitted to provide room service. This was computer controlled. However, due to poor installation and deficient operating procedures it never worked properly and guests constantly questioned charges. In view of the circumstances, the hotel always gave way in case of a disputed bill. The telephone system operated equally badly. Constant complaints from air crew, unreliable operating systems and faulty equipment led to low morale amongst front office staff. Labour turnover was high and standards of service suffered.

Since it was difficult to resolve these problems in human terms due to the labour market conditions and the unstable senior management structure a solution in terms of logistics seemed to suggest itself. In 1974, an attempt was made to install a word processor in the sales department which could produce paper tape. The intention was to use the word processor for mailings and also to use the machine as a data preparation device. Thus guest history data was to be encoded for processing by a computer bureau to produce market information. The machine was subject to constant failures, due to misuse, and eventually was ignored.

Nothing was done to remedy the situation for several years. The hotel was
losing money and the parent company was reluctant to invest further capital. Eventually, in 1978, an international firm of management consultants of excellent reputation, though with little experience of the hotel business, was engaged to conduct an investigation of hotel computer systems. The brief for the study was written by the parent company’s data processing manager, seconded to the hotel for the period of the exercise.

The study investigation was a substantial affair. At the time, the parent company owned three hotels in the UK and the intention was to install computer systems in all three, though YYY was to be the first. The budget for the investigation was £20,000, equivalent to approximately £45,000 in 1985 (13), based on changes in the internal purchasing power of a pound. A comprehensive report was prepared and a recommendation made to the hotel.

At the time, microcomputer based solutions were not available to YYY. Indeed, even in 1986, given the file sizes and transaction rates required, a minicomputer solution would seem probable. By 1979, a number of computer companies with proven track records were able to offer systems which may have coped with the circumstances of the hotel. However, setting aside the findings of its investigation, the parent company chose a supplier with an experimental product.

ABC is an American company with over half the world market in hotel billing machines. As a brand name they are well known and trusted in the hotel industry. However, they have never been able to establish equal dominance in minicomputers. Despite ventures with Cornell University hotel school in the United States and the acquisition of hotel systems developed by other companies, they have made few inroads into the growing market for hotel front and back office systems. In 1978, they had acquired a new system which they called their Modular Lodging System (MLS) and they were anxious to market it on hardware containing bubble memory devices. The company had invested several million dollars researching this particular technology. Anxious for a test site, the combination was offered to the YYY on very favourable terms.

In view of the circumstances, the parent company chose to accept this offer. Bubble memory would offer compact storage with large capacities.
As a semiconductor device it was much faster than disk but unlike RAM it was non-volatile. Linked to the MLS concept a sort of distributed processing facility could be supported whereby modules of the hotel’s operation would function robustly, independent of each other. At the same time, integration could be achieved since all work stations would be linked. Above all, the price was very competitive and the parent company did not wish to invest extra capital. An ABC, MLS system was purchased under the favourable conditions for a pilot installation.

Neither the hardware or the software were ever to function properly. The computer system was almost a complete disaster in every possible way. The system went live in early 1981 handling only reservations. Shortly after it was decided to extend the application to the entire front office; a task for which it had been designed and installed. Accordingly, the system went live on a Saturday and was abandoned two days later on the Monday. It could not cope with the volume and the support from the supplier was described by the hotel as "diabolical". Eventually a legal action was brought against ABC by YYY’s parent company. The computer system was removed and ABC were obliged to pay all costs including the cost of the accountants’ time for calculating losses and sorting out the financial affairs of the hotel.

3.2 The Attitude of the General Manager

The general manager is a man in his late 30s. He is inclined to a formal, traditionalist approach to hotel management that may even be misplaced for an airport hotel and perhaps somewhat counter cultural for 1986. His office is located off a lobby where three secretaries work. The office itself is arranged so that the desk is interposed between the manager and any visitors for formal meetings.

The manager professes little specialist expertise of his own.

"The general manager today has got specialists in all fields. . . . What a manager has become is, in layman’s terms, ‘I've begun to understand you’ [computers]. Now the profit is all important. Before, I never looked at figures, now the accountant is right behind me."

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His management style seems to be a mixture of consultation and direction. He describes his management style as consultative but behaviourally he seems inclined to be authoritative.

"In management terms, I have a management team. The reason I do it that way is because you don't pay people if you're not going to let them make a decision. I'll criticise you if I don't agree with that decision but I'll support you if I do. That's my style of management because at the end of the day we all like to be managers... I'd like to think of our style of management as one of consultation. At the end of the day I'll make the decision but I like to give a person the opportunity of expressing his or her own feelings."

As a contributor, the computer is seen as a way of supporting his control, his decisions. In this he seems to see the computer as a device that has actually provided for a more consultative management style.

"What happened before, be it at this hotel or another, the position is, I said so and that's how it's got to be, without explaining to people why. So as a credit or compliment to the computer, a manager, no matter how much feeling he's got in his own heart, still has got to be a tough manager. And I've got the means."

"We now have the means or knowledge. It's not so much that I didn't feel it in my heart but I have it on facts. There's no getting away from it, facts more than heart."

The computer therefore seems to be construed as a device that adds objective rationality to intuitive judgements.

3.21 Knowledge of Computers and Scanning Mechanisms

The general manager is a firm believer in attending courses and he participates in many conferences. He has actually been on 3 training courses for the hotel computer system and points out that if a guest arrives he can "do the necessary". There is no direct computer link to his office and he has chosen not to have a VDU on his desk. It is apparent that he has very little technical knowledge about computers or the way in which they can drive hotel systems.
"I'm of a traditional background, ex BTH. [British Transport Hotels]. I've had to come to the world of technology and become accustomed to the world of technology. I've always been in the world of civility. I hope it is a happy marriage, one of understanding."

His source of technical expertise is the hotel financial controller. When the general manager rejoined the hotel, the replacement computer system was still giving trouble. Particularly at checkout time when there were long queues. This and other difficulties were resolved primarily by the three agencies. The first of these was the financial controller "whose knowledge in computers is of paramount importance .. and who is committed to training." Having worked with this man in his previous hotel, the general manager trusts his abilities. The second was the computer company that supplied the replacement system. They were encouraged to take a permanent office in the hotel so that technical expertise was permanently on hand. The third action was to appoint a former assistant front office manager as "a person who would come to know and respect the computer."

There are no formal scanning mechanisms. The general manager depends on his two experts to keep him informed and receives mailings which are directed at the hotel by computer companies which happen to have held conferences or meetings there. Not only is his technical knowledge minimal but he does not seem to be a machine orientated person. Even machine based calculation is described not as an aid but as an example of laziness. Thus he does not even care to use a calculator.

"It's a lazy mind that cannot add up. ... I'm of the old school, I like to add up myself and I'm annoyed if it doesn't balance."

3.22 Grid Elicitation

As encountered elsewhere, there was some difficulty in eliciting examples of decisions that the general manager had made in the recent past. The manager mainly described situations which he saw as current problems and talked of these in terms of solutions that he had identified. Three problem situations were described. The most important of these, seen in common with the other two general managers interviewed, was that of
managing room rate against market segmentation. Manager 11 was at an earlier stage of this problem than either manager 10 or especially manager 12 in that he had no present procedures to deal with it. The second problem was to do with linking his restaurant billing and communications system, based on a microcomputer, to his front office billing computer. Due to staffing difficulties he also mentioned development of the restaurant system to give food cost potentials. The third problem was associated with the configuration of the food and beverage facilities in the hotel. The manager had concluded that an airport hotel needs a large informal restaurant (such as a coffee shop) and a small formal restaurant. Again, he was at an earlier stage of this problem than manager 10 who had changed the configuration of his smaller, sister hotel some 12 months previously.

Each of these problems was associated with information needs by the general manager. The first in terms of deciding the effect on profitability by means of a better reporting system, the second in terms of faster communication of data and the third, in terms of obtaining more data so as to be able to analyse guest expenditure and hotel utilisation more completely.

From this situation it was more difficult to discover the technology that the manager used to make decisions. The list of tools and techniques obtained was derived by talking about the devices which were available to him in the hotel.

3.23 Definitions of Technology

The sense of distance and concern emerges strongly. Following the introductory question which leads into asking what springs to mind when he thinks about technology, the manager replied,

"I'm going to lose it because I'm not skilful enough to continue. Will I be able to do the job or not? Am I going to get any more money? Yes, but can you explain it to me?"
Unsatisfactory Innovation with Computers - Manager 11

The General Manager of Hotel YYY

Cluster Analysis of Grid by Program MONOCLE

Cluster Presentation of Grid
Subject 11 - 04.86

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P.R. Gamble
In reply to a further question as to whether technology was perceived simply as complicated machinery, he continued,

"It's a new world. I'm not sure. Explain it to me."

Later in the interview he was to stress the role of his specialist managers who, as it were, protected him from the technology.

"Although at first I wasn't sure, I've come to respect computers. There is a place and it is with service. The right hand knows what the left hand is doing. I do rely a lot on the data processing manager and, more importantly on my chief accountant."

3.24 Grid Analysis

Figure 30 which shows the grid analysis produced by the Monocle program, illustrates a diffuse and open pattern of construing. It lacks any signs of the distinct differentiation displayed by manager 10 in figure 29 or manager 12 in figure 31. The grid is also smaller than each of these comparisons. The constructs fall into two groups. These are,

ONE WAY (tells me), LINKED and used INTERMITTENTLY join IDENTIFIES PROBLEMS, INDIVIDUALISED which is joined by NEEDS TECHNICAL SUPPORT.

ONE WAY in the sense of 'tells me something' is employed as an opposite pole to tele-operated or exchanges communication. This first cluster is probably explained in terms of infrequent use of devices linked to other machines. Particularly in the second group, the sense of needing specialist support for technical devices emerges. The last construct, forms JUDGEMENTS - pushes a DECISION is only loosely related to these two sets.

Elements are construed even more loosely although two groups are discernible. Two pairs of elements are construed very similarly.

STUDY REPORT and OUTSIDE CONSULTANTS are construed as the same. SMALL COMPUTER and LARGE COMPUTER are almost identical.
The two pairs are not closely linked. It is interesting to observe the lack of differentiation between the two types of computer system which could certainly play different roles in respect of decision making. Manager 12, who has a much more developed pattern of construing, differentiates quite markedly between the two different types of computer.

The device clustered next to the COMPUTERS is the TELEPHONE and then there is a link to FINANCIAL REPORT. The computers are only loosely construed in relation to decision making procedures such as TEAM MEETINGS and PERSONAL JUDGEMENT which are construed vaguely together. Instead, the manager has related them to another office machine with a small keyboard and to the financial activity of the key manager ultimately responsible for them.

The STUDY REPORTS and OUTSIDE CONSULTANTS are linked to other devices that this manager does not use, his secretary’s WORD PROCESSOR and the hotel’s newly acquired FACSIMILE MACHINE.

The overall pattern of construing is indicative of low differentiation and imprecise formulation of constructs in relation to technology, as could probably be expected in view of the distancing statements that the manager has made. The manager does not construe computers in relation to his decision making procedures and indeed does not relate those procedures to any kind of tool or technique that is available to him.

3.25 Grid Evaluation

The extent to which the grid might truly reflect the attitudes of the general manager might be illustrated by reference to an information based procedure, central to monitoring the commercial position of the business.

Like the other two managers interviewed, the first report of the morning examined by the general manager is the daily rooms report for the previous day. In common with the other two hotels, this report is prepared by hand. It was a concern of manager 10 that none of the computer systems on his short list could prepare a report in the required format by 8 o’clock in the morning. Managers 11 and 12 have the report extracted from other computer printouts and transposed by hand.
The report layout used by hotel YYY is certainly the most complex of the three. Occupancy and rate data are broken out by market segment on a daily, year to date and comparison against plan basis. The net effect is to produce a piece of paper containing a large table of numbers.

"I need something in my hands at 8 o'clock in the morning when I come in. I like to ring my own work, its extracted by hand from the computer so as to do it my way. The computer gives it otherways and you have to tailor it to your need."

The table of numbers itself is unusable since it contains too much data to be absorbed, nor is it in fact used. The manager interprets the figures in a very simple fashion. On his carefully produced, hand written report, which must take at least 30 minutes to extract from the computer printouts, the manager compares actual versus planned occupancy for each market segment. If actual is over plan the entry is marked with a tick. If actual is below plan the entry is circled. The number of ticks and circles are counted and the balance noted. Ideally ticks exceed circles. This datum is then compared with six other figures. Year-to-date rate, occupancy and revenue, all against plan. By this method the manager reduces perhaps 100 data items to seven, in a matter of moments. His judgement of performance is based entirely on these seven items with no further reasoning or analysis. On the corner of his desk is a large stack of such reports, all similarly marked. Commenting on the procedure, the manager observed,

"On my morning table is the breakdown of occupancies. I can immediately extract the true potential. I then feel that I've done my part. I do it every single morning, writing it by hand makes me feel that I've done it."

3.26 Other General Attitudes to Computers

The underlying pattern, which can be derived from the grid analysis, is one of alienation and fragmentation. This manager is not a technical person and he seems worried about the use of machines and worried about information overload.
"The world is a bit frightening, I'll be honest with you. I think you're getting to a sense of commanding the computer. The computer is a world of understanding. So many managers say, 'this is the computer, it's fantastic'. It's the amount of knowledge you can draw off the computer. Sure, it's endless - the trouble is, do I as a general manager want 48 sheets of data in the morning? No, I don't. So obviously, however good the computer is I need the main summary sheets."

There is a psychological, perhaps even a human, need to get close to what is happening. Personal action such as copying out numbers or drawing on a table is equated to personal involvement and, more importantly, to a sense of control.

"I still feel that personal judgement and service, talking to people, must never be forgotten. If I had nothing on my desk but a machine, is that really the world you want to live in? I don't, I would leave the job. I like to think I'm still in control but just feel I'm more of a manager if I'm able to have technology - reined. . . Let it be filtered. I could have faster, more technology but would it make me a better manager? If I lost that I would lose everything I've been working for."

Computers seem to create a sense of pressure. "I used to control with my pen but now we've got to be fast because I'm plugged into the machine". There is of course no objective reason why actual decisions need to be made more quickly merely because data are assembled more rapidly. The pace of the VDU or the printer seems to be communicated to the manager himself.

The computer installations in this hotel are still far from satisfactory. Indeed, they might even be seen as a source of problems rather than a source of solutions. The financial controller has expressed the view in the trade press that even the new IBM 36 based system has very few advantages compared to a manual system. He claims that room allocation is quicker from (a reception) board and that the computer creates a lot of paperwork. Whilst checkout is quicker, check in is slower. He seems to suggest that the hotel was more or less forced into a computer solution due to lack of alternatives for the now obsolete NCR 250s. Such benefits as there are accrue in terms of management information, neater reports and
tighter credit control (14). These views from a principal adviser seem bound to influence the opinion of the general manager.

It is evident too that the hotel drifts into the crises associated with deficient or no systems analysis by suffering a series of catastrophes. A computer failure early one morning left the hotel with no billing information for its morning checkout and no way of recovering lost data. Data security and continuity of operation had clearly not been considered by any of the "expert" advisers. Duplicate bills are now printed off to avoid replication of the fault. The manager does not appear to realise that in solving his data security problem, a major control weakness has been introduced into his billing operation. The new reservation system does not communicate total current reservation status sufficiently to all operators. The computer system has therefore to be supplemented by a large wall calendar on which coloured stickers are used to flag special conditions. Nor has the computer reduced staffing though it is seen as "a great help so that if somebody is sick, you've no longer worry that you haven't still got two pairs of hands."

Overall, the general construction seems to be that the checks and balances of running the hotel have to be done manually. Technology is there merely to offer confirmation. On this basis the computers are something of a necessary evil to this manager. The general manager's justification for using computers therefore appears to be twofold.

a) "Yes, they will bring benefits. We've spent in the region of £150,000 so I have to say yes."
b) "I want to think I'm a better manager because it gives me information faster."

3.3 The Nature of the Innovation Decision Process

Subject 11 rejoined hotel YYY as general manager in July 1983 by which time the replacement of the main front office computer system had taken place. The original ABC system had been substituted by that supplied by the computer company presently supporting the hotel. The manager himself seemed reluctant to talk about difficulties, failures or reasons for failure though it seems likely that he would have been aware of the
circumstances of the previous problems.

On taking over the hotel in 1980, the present parent company found the business already committed to the ABC system which was to function to such disastrous effect. As problems emerged, so the need for in-house expertise became more apparent. An advertisement for a data processing manager brought the application from the man who is the present hotel financial controller. He therefore joined the hotel as assistant financial controller with special responsibility for data processing, before subject 11. It was the assistant financial controller’s responsibility to oversee the removal and replacement of the ABC system.

3.31 The Nature of the Problem

The point at which the problems of the hotel were addressed in each case occurred only when they had reached the proportions of a crisis. Faced with obsolete billing machinery which it was obliged to replace and in the light of constant machine breakdowns, it is evident that the initial decision to computerize was somewhat forced.

The original problem appears to have been approached at first by a rational and objective procedure. Consultants were employed to undertake a formal search. The reason why the consultant’s findings were disregarded cannot be given with certainty. However, observations by manager 10 who was employed at YYY during this period and other widespread but unpublished reports of this activity permit certain cautious conclusions to be drawn. (It should be noted that this researcher was employed at hotel YYY during the period 1973 to 1974 and that some loose personal contact with the data processing manager seconded to the hotel was maintained). In the circumstances, it appears that the search consultants’ recommendations were disregarded on the basis of financial expediency. This is clearly a political effect.

The second crisis was even more precipitous, being the failure of the ABC system within two days of full scale operation. For a hotel accustomed to poor performance from electro-mechanical and computer based information technology the nature of the failure must have been very significant. This particular organisation, accustomed as it was to limping along with
inadequate systems must have found itself confronted finally with a major, intolerable failure.

3.32 The Search Procedure

The search procedure for a replacement was led by the new assistant financial controller. This time, search consultants were not used and the controller drew on his own expertise. From a report of the process, it appears that for the controller, technical criteria were not a primary consideration.

"When we started looking again we decided we would have a front desk and back office system. This limited the number of suppliers, especially when we wanted a tried and tested system to rebuild staff credibility."

The financial controller is also reported as saying that five systems were considered closely. Surprisingly, what clinched the decision was not the computer's capability but that of the salesman.

"Most of the others were rejected because the people selling them didn't know what the systems could do. One salesman couldn't even demonstrate the product he was selling and not sufficient people knew about the systems hotels require." (15)

Ultimately the hotel was to spend £200,000 on two IBM computers, 22 VDUs, 7 printers and training for some 80 people. However, it is apparent that the combination of software and IBM 34 hardware that was originally installed was not fast enough to cope with the work load (though this was not reported in the press). It would appear that neither a formal systems analysis nor any sort of benchmarking had been undertaken. As reported in each of the other two cases, while general managers are wont to lean on their financial controllers for advice about computers, the latter do not seem trained to give it. That the IBM 34 could not support an operation of this scale is not remarkable since the IBM 34 is less powerful than a 1985 microcomputer such as the IBM PC AT. In fact the IBM 34 was phased out of the IBM product range in 1985.

When he rejoined the hotel, the general manager reports that the first
replacement front office system was taking "16 to 17 seconds" to produce a bill. It is not clear whether this was a function of the software, the computer or the printers. However, it is apparent that the hotel had endured the associated queues for at least one year. Again, no formal analysis was made of the problem and no outside specialist advice was sought. "I had the technical expert, [the financial controller], that was a cost saving". The problem was "identified" from comments on guest room questionnaires, an example of a statistically invalid sample of guest reactions, and by casual observation. The general manager has a closed circuit television monitor in his office from which he can observe the lobby.

By this time, the system supplier, a company which specialised in hotel front office systems, had been encouraged to open an office in the hotel. It was therefore on hand to give advice. The unfortunate experience with the company’s first offering which had failed to perform to the standard to which it was no doubt represented, does not appear to have soured relationships between the two organisations. The recommendation to upgrade the system almost certainly suited the computer supplier both commercially and in terms of being able to substitute a model that would enjoy the continued support of the manufacturer.

The latest front office system, installed in March 1984, is now fast enough to produce a guest bill in 7 to 8 seconds and is capable of dealing with a large checkout. However, the system design is not adequate to cope with a large check in, which implies some inadequacies in the computer procedures for group handling and pre-registration.

"To give you an example, I do a check in as we did last night for 200 ... representatives. I couldn’t do the check in at the desk. You have to take the keys out, get the list and do it. That’s faster than it is on the computer."

In 1985, the hotel undertook the installation of a food and beverage billing and control system. This project was initiated by the financial controller (having been promoted by this general manager) who also undertook a partial analysis of the problem. Proposals from potential suppliers seem to have been accepted as the main basis of any systems
analysis. Although the supplier of the front office system bid for this contract it was placed with another company, predominant in this particular market place. The contract was quite substantial, being worth £50,000 but again no outside advice was sought. The system has now been installed in several food and beverage areas, the main restaurant, room service, banqueting, bars and the coffee shop. However, this system is also adjudged too slow by the general manager in one critical area — that of breakfast service.

Billing breakfasts to hotel guests before they checkout in the morning is a procedure of considerable interest to many commercial hotels. A great deal of time and trouble is devoted to developing procedures which will cope with guests who take breakfast and then leave immediately or who checkout and then take breakfast. It may therefore be considered unusual for a hotel to install an expensive computer system which is unable to deal with that aspect of a procedure which presents the greatest difficulties.

3.33 Staff Involvement, Consultation and Training

Whereas manager 10 had suggested that many staff difficulties ensued when the ABC front office systems were installed, the present general manager reported no further problems when the replacement system was upgraded. There was extensive staff consultation at this stage to help minimise further potential difficulties. Earlier problems concerning lack of support from the supplier were overcome by the presence of the supplier actually on the premises. "Day and night cover" was provided for the first week after going live and apparently, the system was working to the satisfaction of all concerned after two months.

"I don't mean to sit here and boast but one thing I hope I introduced into this hotel . . is that we began to communicate. If there was one problem in this hotel it was communication. If you don’t talk to your staff then don’t expect them to talk to you. It’s the old adage, if you don’t tell them, they don’t know."

Thus, despite the fact that the hotel is highly unionised, manager 11 reported no resistances or difficulties with the introduction of the food
and beverage system. Consultation took place "more widely than we had ever done because here we were in the food and beverage world", and the manager expressed his satisfaction at the way the food and beverage system had been accepted and used. After the previous difficulties, staff were not unnaturally concerned. Training was therefore restricted to 45 minute sessions and serious work was interspersed with playing computer games.

"We started with ladies, middle age ladies whose word [sic] of computers might be their son telling them about it from school and here they are, plugging away on a ... system. And they think it's great."

Since the assistant financial controller was promoted to controller, an additional appointment was made of a full time data processing manager. This was partly to relieve the controller and partly due to a continuing need for training resulting from staff turnover. However, even this position has been hard to sustain. Within just over one year, both persons appointed to this role from outside the hotel had left to join other companies in a similar position. It was finally decided to make an appointment from within and the task is currently undertaken by the former third assistant in the reservations office. The data processing manager is therefore someone without a formal background in the computer area.

3.34 Implementation

The operation of the two main systems seems to function at an acceptable level for the hotel though it is quickly apparent to an outside observer that neither system actually functions adequately in terms of what the hotel requires. The front office system is too slow for checking in large groups and the food and beverage system is too slow for use at breakfast time. In these situations the hotel switches to manual procedures. Such suboptimal performance has been accepted.

Monthly meetings are now held with the supplier of the front office system. These are described by manager 11 as being equivalent to a system "reorg". The terminology represents an interesting use of jargon and perhaps provides a further perspective on the way in which computers are viewed. It seems that some IBM operating systems need to reorganise.
the use of disk space from time to time in order to maintain access speeds. This procedure, known as a file reorganisation, is sold to hotels as a necessary requirement of any computer. In the case of hotel YYY, it requires taking the main computers out of service twice each week for a period of up to an hour. The hotel can choose when to do it and the YYY usually does it in the early afternoon when the front office is quiet. When asked whether he had ever wondered why the machine needed to be taken out of service in this way or why it was not programmed to reorganise its files as a background job, the manager replied,

"I never complain, nor would I. If it's a procedure situation then fine. If we do it ourselves we get to know the machine better. ... the machine should be controlled by man. The more you think that machines can do, the lazier you become."

As for the food and beverage system, before implementation, meetings took place with the staff union to give assurances that no jobs would be lost or any work procedures affected adversely. It was decided not to provide cash incentives to encourage cashiers to work with the system. There was no attempt to recognise the possible implications of the change for other procedures. Some minor alterations were made to the menu but this was an example of the hotel moving to suit the machine (so as to simplify data entry) rather than an effort to revise overall efficiency. The manager could recall no instances of staff losses resulting from the introduction of the new computer system. What manager 11 offered was a picture of the restaurant exactly as it was before in all major respects but with a computerised billing system.

No substantial differences were observed in the areas of staff recruitment and retention. However, the deskilling effect of the food and beverage billing system has made it harder to recruit and retain restaurant cashiers. The manager attributes this to the effect of technology. Since the hotel has now been pushed into training more carefully for front office staff it is actually easier to acquire staff. No previous experience is necessary and provided the individual has reasonable social skills, the hotel will undertake the necessary technical training.

In general, the manager reports staff attitudes as very positive. Guests
too seem to like the computerised checkout procedures, at least in so far as feedback from bedroom comment cards is concerned.

3.35 Management Evaluation

No evaluations of any of the hotel computer systems have taken place against any feasibility study nor against any set of objectives. Manager 11 did not think it possible to evaluate the systems in terms of a monetary value, rather he thought the machines might be justified in terms of service. This notion of service was not quantified or measured in any way. He also felt that the use of a computer (in a visible way) in itself contributed positively to the image of a large airport hotel.

There are no well established plans to add further systems. There are outline plans to put personnel records onto a computer. There is also the prospect of future collapse of the in-room vending system. The company supplying this system went out of business one week after the hotel opened. Despite its lack of reliability, the hotel has kept the system in service but clearly has to contemplate the day when the system can no longer be repaired. From the nature of the manager’s language, it seems likely that the replacement decision will be taken only when failure is imminent.

3.4 Summary of Main Findings

Hotel YYY has a history of difficulty and failure with computerised operating systems. Manager 11 joined the hotel three years ago after an expensive mistake had been rectified by replacing one system with another. The original choice was made after setting aside a careful technical appraisal on the narrow basis of cost. Technical problems were subsequently compounded by poor support from the manufacturer and poor staff communications. Replacement was undertaken by a specially recruited accountant whose primary criterion for computer selection appears to have been the personal performance and enthusiasm of the sales personnel, rather than the technical performance of the system. Yet another replacement was then required by the hotel as operating conditions became more and more unacceptable.
The general manager himself clearly knows very little about computers and is prone to distance himself from the technology. The grid analysis is indicative of an undifferentiated, poorly developed and to some extent inappropriate pattern of construing in relation to this technology. He therefore leans very heavily on the advice of "experts" such as his accountant and such as suppliers. Thus the choice of food and beverage system was made on the basis of a preliminary study by the accountant supplemented by detailed recommendations from a supplier.

Technically, the hotel is operating several computer systems worth altogether in the region of £250,000 which each seem to be deficient in some major respect. There is a sense of the hotel using the technology despite the inclinations of its senior staff. Thus the financial controller is quoted as saying,

"It's a mistake to think you're going to save time installing a computer, as an industry we have been forced into computers because there is now nothing else to do the job the old NCR 250 performed." (16)

The general manager seems to share similar views. He does not construe the computer based systems in relation to the decision making nor use the outputs of the computers for determining the performance of the hotel. As an individual he clearly wishes to distance himself from machine based activities which he sees as inimical to his quality of life in general and his notions of hotel service in particular.

It does not appear that either of the two senior managers have attempted to identify and meet operational or decision needs through technology. Despite expressing such a firm view, the manager is not identifying his decision needs before allowing systems to be chosen and installed. As a result, systems are chosen that are almost predestined to be unsatisfactory and it would seem that the manager is resigned to the fact that a computer system will not fit in with the needs of himself or the hotel. "I'm not a desk man. I have to be out there leading from the front." The general manager seems predisposed to react intuitively to problems and is not inclined to make extensive use of technology to help him. He is relating to computers purely at the mechanical level rather than at the information systems level. Thus the fact that he can operate
the computer so as to check in a guest satisfies him. He does not seek to question deficiencies or constraints associated with unacceptable procedures or a lack of decision support. This is the alien world of the computer.

4 Case Study 3 - Successful Innovation with Computers

Case study 3 took place at a large hotel in central London. The ZZZ has 850 bedrooms and employs about 450 people. Its annual turnover is approximately £16m. It is therefore a substantial commercial enterprise. A middle market hotel like the other two hotels studied, it had an average room rate in 1986 of about £40. It may be regarded as a successful business by two measures. As a business it is very profitable. As a hotel it has received a number of awards. In 1986 it was voted best economy hotel in the world by an international executive travel magazine.

The general manager of hotel ZZZ has possibly a greater autonomy than that of the other two hotels studied. The hotel belongs to an airline which owns only one other hotel (in Paris). There is therefore little hotel expertise in the parent company which may be used to shape or constrain how the hotel is run. The general manager has a reporting relationship through to the board of the parent company itself.

These circumstances have conditioned behaviour in several important ways. As the general manager explained one influence was the perspective of the senior management group.

"We had a freedom that very few people had and we were able to use it. As an airline, NAME is very computer orientated. The top people are computer people not airline or hotel people."

In fact, the airline also operates a substantial computer consultancy as a separate division of the company.

Another circumstance was the fact that the hotel was not part of a chain. This general manager feels that other managers in group hotels are "afraid of getting things done, they are very, very wary", in career terms. In large hotel groups managers may be more concerned about possible
censorship by superiors in the competition for promotion from many other managers. This may also cause them to favour projects which show short term gains for their department or unit at the expense of longer term consolidation.

The point may be illustrated from a conversation that took place outside this research with a graduate from the University of Surrey. He explained that although he could recognise the need, he did not want to suggest the introduction of a computer system into the banqueting department where he worked. Had he done so, he would probably have been asked to see the project through and this would have kept him in the department for eighteen months to two years and he felt that this would not further his career. Managers in ZZZ are encouraged to take a longer perspective.

"My management team are ambitious and want to make a success of what they do. They want to do well in the long term as well as the short term because we are not part of a chain. A quick advantage that shoots you to the next level in the group is not available here."

Finally, the general manager feels that even his market positioning is an advantage.

"We can go ahead and do things that luxury hotels can't because we haven't got an image to protect."

4.1 The Background of Computer Usage

This freedom is evident from the range and manner of computer systems that have been installed. The hotel was opened in February 1973 and the present general manager was employed in January 1974. No computer systems were installed on opening. Perhaps significantly, asked for the approximate installation date of the main computer system, the manager answered precisely with December 12th, 1977. The hotel has extensive experience with the use of computer based systems stretching back almost ten years.

Currently, there are "14 or 15" different types of computer systems in the hotel. The main front office system, now based on two Phillips
minicomputers, represents the most expensive system with an installed value of about £250,000. In addition there are numerous supplementary systems mostly based on general purpose microcomputers but with one or two specialist applications. Examples of the latter would include not only the departmental point of sales systems linked into the front office but an electronic locking system, a microprocessor controlled vending system for staff feeding, a microprocessor controlled pay-as-you-view television system, and an electronic telephone switchboard.

Stand alone microcomputers are used throughout the hotel. Thus there is a call logger attached to the switchboard and a food and beverage control system, both of which run on IBM PCs. Wang microcomputers are used by housekeeping and plant management for the preventative maintenance system. The asset register is kept on another Wang and the back office system, linked into the main minicomputers supplements its word processing requirements in the accounts department with another Wang. A Wang network system is under development in the banqueting department. The marketing and sales department have yet another Wang for database applications and mailing. There are three Sword, 8-bit microcomputers, two of which are used by personnel and the third in the stores. Finally, on the general manager’s desk there is an Amstrad word processor which is used for spreadsheet applications.

Very possibly the hotel has more computers than any other unit in the United Kingdom. Certainly the hotel uses computers, throughout its operation, more broadly than most others. Applications are not confined to narrow areas such as front and back office. Computers are used throughout the hotel in both line and staff departments and for both general and specific applications. The total investment in computer systems is probably approaching £400,000.

4.2 The Attitude of the General Manager

That the manager likes gadgetry is evident from the range of systems that he has purchased. His interest and hardware is not confined to computers.

"There is no piece of equipment that I don’t enjoy having around me because I have suffered all the effects of not having it. My only problem is how

P.R. Gamble
In his late 50s, the manager refers to himself as the oldest member of the management team. Most of his department heads joined him in their twenties and many have stayed for several years. His senior managers are therefore in their thirties and forties and they are almost all male. The general manager has a long career history in the hotel industry and has followed a very traditional route to the top, despite his education.

Following a degree in philosophy at the Sorbonne he worked his way from junior management positions to become a general manager. He has managed hotels in other European capitals before joining the ZZZ. His early experiences in the industry, in both rooms and food and beverage, were in hotels that used little machinery and seemingly few formal procedures.

"Everything was done manually. We kept a £2 float in the front office which was used to buy candles in the local church when we were overbooked."

He described his management style as consultative and clearly attaches great importance to direct, personal contact with staff throughout the hotel. His office, reached via his secretary’s office, contains a large oval table. He himself works at one end of this table on which his Amstrad computer is placed. A person talking with him simply joins him at the table. He neither moves away from his desk, like manager 10 nor interposes his desk as a formal barrier, like manager 11.

He depends a great deal on direct, verbal communication. It is his practice to spend several hours each day moving around the hotel talking to staff and to department heads.

"Most communications are verbal. I very rarely send out a memo. I keep telling my managers, silence is hostile. If you don’t talk to them [the staff] they’ll think you hate them."

The general manager interprets his role as that of an arbiter, governor and co-ordinator.

"I create responsibilities and give authority. I rarely discuss serious detail. If people can run
their own show they get no interference from me."

His opinion of his subordinates is very high. In their own fields he regards them as experts. They are seen as knowing their jobs backwards, all "very intelligent, their intelligence in other areas I don't know about and it doesn't interest me greatly". Such statements probably reflect high morale and commitment. The manager identifies very closely with his job and with the success of the hotel. Good information is seen as a part of that success and computers are considered integral to producing decision support information.

"The hotel's success is my success. My objective is to make my job totally redundant. It [computers] takes the chance out of it. It decreases the amount of things you have to worry about. If you know about them [problems] you don't worry about them so much. If you know about them you can find a solution. My job is very important to me. I don't do anything else except work. I spend a lot of time on my job."

Thus where manager 10 talked about the quality of information, manager 12 talks about balance.

"This is a very informed office. The way I make decisions has to be based on information. It has to be accurate, relevant, timely and balanced, which is very important. . . In other words, I'm not looking at one piece of information I'm looking at them all together. . . That's the way we decide. That is, when I'm not deciding stupidly off the top of my head. Most of the time, when its anything of a serious nature, I collect a very large amount of information. Some of it is opinion. I accept that as opinion or I may balance it against performance information from other sources. I balance it."

The manager describes his decision making in terms of a pyramidal structure that draws information to decision making structures at the top.

"The information process in the hotel is a pyramid. At the bottom is a large amount of information being collected by a whole lot of different people. . . At the top is a very small amount of information. It is in fact the synthesis of everything that is coming to the top, to me. My level of decision making is quite small in the
sense that most of it has been decided or dealt with, I hope, before it actually reaches me. When it reaches me and it's wrong, I go back down the line to the point where it's wrong."

Clearly such a structure could lend itself to manipulation by members of the organisation who were lower in the hierarchy, transferring power in the manner discussed in chapter 4. Both Mechanic (17) and Lee (18) have interpreted access to information, people and resources as important sources of power for subordinates in organisations. The general manager discounts the dangers of obtaining information which might be biased so as to obtain a particular outcome, due to his own experience. "There used to be a bit of that but I'm an old hand. They get their ass kicked next time."

4.21 Knowledge of Computers and Scanning Mechanisms

The general manager has no formal training in the use and application of computer systems, nor it seems did most of his staff. However, he has two sources of expertise which are used more or less formally. The first is the computer consulting company owned by the airline parent organisation. This is seen as a source of all the latest developments if required. The second, slightly more formal mechanism, is that the hotel employs a full time computer services manager whose job includes monitoring developments and informing management as required. The computer services manager is someone with a hotel background who has been trained by the company that supplies the main front office minicomputer system.

Expertise based on involvement and based on the personal development of managers who have worked on their own systems, is more widespread in this hotel than in the other two case examples. The general manager explained that he has,

"... half a dozen people who are very familiar with computerisation and some of them are very good at it. These people become involved in various circumstances, it's not limited to the computer services manager."

He went on to cite the banqueting manager and the food and beverage manager. Interestingly, although the financial controller would
undoubtedly figure on a complete list of such experts, he was actually referred to very little in either interview. Although a former financial controller played an important part in the computer selection process, a principal actor and development agent was given as the assistant general manager (AGM). The AGM was described as "very skilled" and undertook a central role in the installation of the main systems. The direct involvement of a line as opposed to a staff manager may be important here.

A second important factor may be the stance taken by the general manager in respect of innovations. Whilst passive scanning is not highly developed, heightened attention and active search is quickly brought to the fore. If a development of interest is noticed, the computer services manager is despatched to investigate and report, "either verbally or on a single piece of paper". In any event, the hotel does not see itself as waiting for developments to take place elsewhere.

"We are in a constant state of development. What we are really trying is not to let the computer industry dictate to us what we want but to get them to produce what we need. A totally different view of the situation."

In a way, this innovative approach is seen as doing away with the need for a great deal of formal scanning. There is an awareness that many developments in computing are outside the scope of the hotel's needs. At the same time, the hotel sees itself as having developed a lot of its own systems which have now been sold on to other users. There is a sense here that few specific computing developments are likely to occur which are of direct interest to the hotel whilst at the same time, this hotel sees itself as a leader in this particular field.

4.22 Grid Elicitation

The more fluid management style adopted by manager 12 presented some difficulties for eliciting the grid. The manager does not see decision making as an event but as a process, in which he has a part to play. He therefore had some difficulty in naming decisions that he had actually made. The question gave rise to a pause, "Gosh, I make thousands of decisions per hour." The type of decisions in which he became involved
principally were "development decisions". In terms of the process that has already been described, it is apparent that many of the decisions are shaped by lower levels of the organisation.

"Decisions are rarely taken by me in isolation. They’re taken all the time."

Four decisions were eventually cited, two capital expenditure decisions concerning product enhancements, a marketing strategy decision and the annual pay increase decision.

The techniques used were equally unstructured but the pattern that emerged was much richer.

"I have a simple technique for making decisions. Information is my basis for making decisions."

Thus his description of the network of information procedures that the manager saw culminating in his office included a balanced range of both hard and soft data. The manager pointed to the layout of his office as a part of this process.

"That’s why my office is this way. I will meet 9 people together or on their own. Some people carry enough information on their own. Sometimes I need to get a balanced view."

4.23 Definition of Technology

Computers seem to figure centrally in the way that the manager defines technology. Perhaps unsurprisingly for a manager who sets great store by interpersonal communication, computers were defined first in terms of their communication facilities and then in terms of an information device.

"Technology is basically the use of computers. The main purpose is 1) as a communication system and 2) as an information system."

When pressed as to whether technology was seen entirely in terms of computers, the manager expanded the definition but continued a construction which focused almost entirely on material technology.
"Not totally, I'm technically interested in any form of mechanical or electro-mechanical or computerised activity which reduces the amount of work that has to be done. ... I'm not limited to thinking of computers but that's the first thing that springs to mind."

4.24 Grid Analysis

The grid analysed by the Monocle program is shown as figure 31. The constructs are grouped into two main clusters which together reinforce this idea of balance and integration that seemed important to the manager in the interviews. The first cluster contains,

ENDS and LOOKS BACKWARDS the most closely linked constructs which join
INDIVIDUAL (for the manager) and AD HOC

The second cluster comprises,

PARTIAL, CONSULTATIVE and ONE OPINION.

These two sets are linked rather loosely and then joined by mechanical, ONE WAY device. Finally, somewhat unrelated to the other constructs is the notion of ANALYSING in the sense of not communicating.

From construct theory, to construe an element on one pole is to imply that it does not contain properties of the opposite pole. Thus on the opposite pole there is a set of constructs which imply the process of what might be termed groping forwards. Constructs which are both MEANS and orientated to the FUTURE are important as are, related to the WHOLE HOTEL (a sense of integration) and USED A LOT. The term 'used a lot' is cited literally and is taken to mean, used often. BALANCED, CONTROLLING, and COMPLETE are also seen as a set.

The elements also fall into two main groups with three elements not closely related to either set. The first, unrelated pair which are construed as almost the same is,

SYNCHRONAMICS and COMPUTER REPORTS (budgets, payroll).
Synchronamics is the proprietary name of an American system for which the hotel paid £50,000. It appears to be a method for allocating standard times to jobs so as to regulate and control labour costs. The procedure is worked manually and department heads are required to complete time sheets indicating their labour requirements as part of the hotel's 10 day forecasting procedure. These two sets of reports, one machine based one manually based are construed as one way, mechanical, ends, analytical, partial, backwards looking and more for the manager than for the whole hotel. However, they are seen as being balanced.

The two main element clusters are

TEAM MEETINGS, INTEGRATED INFORMATION SYSTEM and LARGE COMPUTER to which TELEPHONE is linked and

CALCULATOR and PERSONAL COMPUTER
ONE:ONE MEETINGS and PROFESSIONAL CONSULTANT to which PERSONAL OPINION is linked.

The first set of elements are group based and are construed highly on the construct for communications. The second set are individually based. SPREADSHEET ANALYSIS is loosely linked to this second set. The personal computer and the calculator are devices which the manager uses directly, individually and intermittently and this is probably why personal computers and large computers are construed differently.

4.25 Grid Evaluation

The pattern of the constructs is fairly open, though elements are tightly grouped within their respective clusters. This implies that each element cluster is well differentiated from the others though the elements within each cluster are not so clearly distinguished. Note that these constructs are much more firmly developed than those of either manager 10 or manager 11. The pattern is much more reminiscent of other "technological" managers such as subject 4 or subject 8 which show equally developed constructs in relation to sets of tools and techniques.

Curiously, many of the constructs which are applied to the two main element clusters would seem to be counter to those values of integration (for the whole hotel) and balance which the manager describes as being
There appears to be some kind of discrepancy between the manager's descriptions of his preferred management style as consultative and participative and the controlling, one way, backward looking elements that he uses most often and which are more strongly construed in terms of the whole hotel as opposed to himself.

The most significant aspect of the grid analysis is the way in which the computers are construed in relation to the manager's style. The large front office computer system is seen as a central element to the integrated information system and work in a group. The small computer used directly by the manager is construed in a similar vein to individual one to one meetings and professional consultants. By contrast, manager 10 construed small computers in terms of a purely number based device and manager 11 construes them merely as machines like any other machine such as a telephone, not related to any other management tool very much. Computers large and small, are construed by manager 12 more appropriately integrated with people based activities than has been observed with the other subjects studied. The computers are actually construed closely to the people based activities that form part of decision making.
Successful Innovation - Manager 12

The General Manager of Hotel ZZZ

Cluster Analysis of Grid by Program Monocle

Cluster Presentation of Grid
Subject 12 - 04.86

(C) P.R. Gamble 1984
4.26 Other General Attitudes to Computers and Hotel Management

The grid analysis provides a useful insight into the manager's view of technology in general and computer based procedures in particular. Essentially computers are seen as tools which neither threaten nor enhance a job in themselves. It is a very pragmatic perspective based on two questions, "will it do the job?", and "will it work?".

Like manager 10, manager 12 does not want the computer to act as a barrier between the guest and the guest contact staff but the emphasis of his concern is different. He is worried about implications of dependence on the computer and his concern is couched in terms of self reliance.

"One of my first rules is, 'don't you ever say to a client the computer is wrong'. You're wrong and you've got to admit it."

The general manager himself claims no understanding of computers. He says that he does not know how they work and that he is unable to program them. However, in the course of using "this tiny little machine (the Amstrad on his table) for his own personal analysis", he actually programs his own spreadsheet. Forward projections and comparisons of marketing mixes are also run through this spreadsheet. His attitude to the computer as a forecasting tool illustrates another aspect of his determination to use technology as appropriate. The hotel uses three sets of forecasting reports, a 1 day, 10 day and an annual forecast. The latter is regarded by the manager as the most complex of the three so that while the first two lend themselves to a machine process, the third does not. The reason for this seems to be the complexity of the problem environment in the long term.

"I can get within 1% or 2%. This year we'll do 86% or 87%. A computer can't improve on that."

Thus a clear distinction is being drawn between situations which are well structured and those which are not. That a forecast which draws on a great deal of soft data, such as an annual forecast, may not be improved by any amount of Bayesian statistics, is indicative of a considered appraisal of the problem environment.
Thus expectations about performance and results which are unlikely to be realised, such as those made by subject 10 are not formed. The role of a computer either in data processing or in decision support, and its relationship to the procedures which surround its use are kept in perspective. If attainable expectations are formed, it seems evident that the opportunities for meeting them and therefore for satisfying the user, are more likely to be met. The emphasis of the manager is in creating a total system that will work.

"The key is how you manage the system. It's not the system but the organisation of the system... getting the procedures right around it. These are the areas I concentrate on, I don't know how they [computers] work."

4.3 The Nature of the Innovation Decision Process

The general manager himself was the prime actor in the search for a computer system. For advice and support he seems to have drawn on two other hotel executives. The AGM played a major part in the selection and implementation process. The hotel's financial controller, an ex-employee of IBM, was used as a source of expert advice. Further deliberations were also made with the parent company's computer consultancy division.

4.31 The Nature of the Problem

The problem addressed was, as in the other two cases, of the crisis type. In 1974 when he joined the hotel, the general manager was faced with a situation which made the need for some sort of technological solution very evident.

The problem was in two parts, the first of which resided mainly in the design of the lobby area of the hotel. The normal practice in designing such areas is to locate reservations, reception and billing departments in close proximity, usually in adjacent offices, to allow for easy physical communication. In the ZZZ hotel, the architect had separated the three in a lobby design that made their physical relocation very difficult. This led to numerous operational problems, and, coupled with limitations in
linking the bill office to departmental sales outlets was associated, with a situation in which nearly £700,000 of untraceable ledger charges had to be written off. Based on the general index of retail prices (19) this is approximately equivalent to £2.6 million in 1985 values.

In view of this overwhelming crisis, the second problem was somewhat obscured. However, due to limits imposed by the physical design, the hotel was operationally constrained in terms of marketing. An 850 bedroom hotel, running at 85% occupancy in central London, with an average length of stay of about 1.5 days would need to cope with 482 arrivals and 482 departures every day. Were all of these guests individuals, known in the trade as FITs (free, independent travellers) then the work load for the reservations department would be correspondingly high. In the circumstances, the hotel could not possibly deal with this sort of volume. Consequently it was forced to trade almost entirely in group business where the number of daily transactions is much lower. Unfortunately, the discounts that are given to groups mean that much lower average room rates are obtained.

The hotel was therefore losing money in two ways. First there was the widely recognised problem of being unable to control and collect its income. Second, there was the problem (probably more evident to the management team) that potential revenue was not being achieved due to a poor marketing mix.

4.32 The Search Procedure

The search process was begun in 1975. The problem to be solved was defined in terms of communications which is probably why this figures so importantly in the general manager’s pattern of constructs. Solutions were considered in terms of closed circuit television and facsimile machines. The former did not provide for hard copy and the technology of the latter was so poor in 1975 that much of the transmitted material was illegible.

The recognition that a computer based solution was possible followed a demonstration of a small system by the Sweda company to the board of directors in 1976. This appears to have encouraged the board to allow an
investigation and to have convinced the general manager, the assistant
general manager and the financial controller that computers were the
answer.

The initiative for the search is perceived entirely in terms of the hotel.
The general manager explained that, "most people didn't know that a
computer could be put in a hotel, even the University of Surrey, nobody
knew anything at all." The statement is probably not intended to be taken
literally. By the mid-1970s, the British hotel company Strand Hotels had
been using computers in large, London hotels for some 15 years and several
American hotels had been using computers for almost ten years. The
sentiment being conveyed is probably the sense of isolation and lack of
information which the manager faced.

The search process was quickly narrowed. The evoked set from which the
manager made his initial telephone contacts were ICL, at the time the
major British computer company and two companies well known in the hotel
industry for supplying billing machines, Sweda and NCR. These contacts
led to visits which produced more information. Visits were made to an ICL
installation in Paris, a Minitech installation in Montreal and a large
hotel in Las Vegas. Criteria for selection were evolved. The system had
to be working in a large hotel, it had to provide for integrated data
processing (by which the general manager meant good communications), it
had to be user friendly and it had to be supplied by a company that would
update and modify its software.

The potential supplier list was quickly focused on three companies,
Motorola, EECC (Electronic Equipment Company of California) and Sigma
Data. Motorola were discounted because they would not discuss updates.
EECC, then as in 1986 the company with the largest share of the world
market for minicomputers in hotels, was dismissed as not user friendly.
Sigma Data the smallest company in this group were chosen as being most
willing to meet the hotel's needs, possibly because they saw a marketing
opportunity in linking with ZZZ's parent organisation. The Sigma Data
system had already been licensed for sale in Europe by Phillips of Holland
but no sales had been achieved.

During this search, no formal consulting advice was sought. Such
technical appraisals as took place were based on the demonstrated capability of a system to perform in some more or less comparable situation. This is very similar, both in the rapid narrowing of the problem environment and in the method of evaluation, to the process intended in case study 1. The computing expertise of the financial controller was probably of limited relevance in the context of hotel front office procedures or indeed, in terms of evaluating the technical aspects of computer performance.

However, once a target supplier had been identified, the parent company’s computing consultancy was involved and a formal specification and contract were worked up. This large document acted as the basis of the case to the main board and stood behind the request for £250,000 of capital expenditure, a sum equivalent to £932,000 in 1985 values. For the reasons already alluded to above, the board was very receptive to the proposal. The purchase was approved and in fact the airline’s computing consultancy division took a licensing agreement for marketing the system in the UK.

4.33 Staff Involvement, Consultation and Training

During the selection process itself, only the three senior hotel executives were involved. There was no early staff consultation. The hotel had and has no union. Like manager 10, manager 12 does not seem keen to encourage unionisation. Once the supplier had been selected, the AGM was seconded to the computer company where he worked on two American installations. One as an observer of a new implementation in Las Vegas and one in which he actively participated in New York.

The general manager then began a major public relations exercise with his staff as a whole. "We set out to create a great sense of excitement about the whole thing." There were discussion groups and lectures to explain what was about to happen. A second member of the hotel’s staff, at department manager level, was seconded to the computer supplier to train as the hotel’s computer services manager. This person was later to join the computer consultancy as a full time trainer.

Material incentives were also provided. The first of these was an immediate pay rise for all the staff involved with working the system.
The second was what the manager called, a skill incentive. This was the personal development for staff who would learn about the computer.

4.34 Implementation

The computer's arrival was used as an opportunity to review and modify other operational procedures in the front office. Such organisational development would therefore avoid a situation in which a computer was being superimposed on manual procedures designed for different purposes.

"Every time I have spent money on any capital item I have regarded it as an opportunity to do other things. The computer is not exceptional. Every time I bring in a computer I'm looking for something to be done better, cheaper, more intelligently."

The cutover from the manual to the computerised procedures was undertaken in a single phase. Initially support was provided by the American supplier. Some problems of jargon and communication were experienced. "They all spoke American and we had to learn to put in the date backwards for the computer." The latter is a reference to the use of American date formats on the hotel's reservation system. This has now become accepted practice in the hotel which has convinced itself that such formats are an essential aspect of the technology. After one month, the airline's computer consultancy division opened an office in the hotel. Support was then continued by the two change agents, the AGM and the hotel's computer services manager, along with the consultancy staff. Competent technical support was therefore available.

However, within two months the hotel ran into major difficulties due to weaknesses in the system design. Due to problems in the design of the room status system, the hotel began to run out of rooms. During the low occupancies of December through February, large numbers of rooms unavailable for sale did not unduly inconvenience an 850 room hotel. However, as the business began to pick up for the Spring, pressure increased. Nor, did it transpire, was the debtor situation improved. The accounts receivable ledger had been designed on a balance forward as opposed to an open item system. (In an open item accounting system, credits are associated with their corresponding debits so that unpaid
charges can be specifically identified). The accounting department ran into more and more problems.

The general manager called a total management conference to clarify and overcome the problems.

"The hotel business was not a logical business up to that point. It was emotional, it depended on flair and all that stuff we used to hear about."

The manager fought for and got the accounting software modified to run on an open item basis. A secondary computer system was purchased, actually linked into the hotel’s telephone system, to handle room status.

Initially, there was a rapid short term increase in staff turnover. About 20 people left or were displaced through natural wastage. The hotel’s front office manager who had always expressed concern about the computer’s imminent arrival also left. Fortunately, a young manager in the front office had shown himself very keen to learn all about the computer’s operation. He was immediately given a promotion which more than doubled his salary and appointed to take over the front office. On the whole therefore, the manager recollects no great ill effects for the hotel. In the long run, subsequent upon an expansion of business, employment in the hotel actually increased. Labour turnover is thought to have been reduced and recruitment made easier by the use of computer systems.

"You create loyalties to the quality of management. Staff expect to be well managed. You provide the equipment, you teach them how to do the job and they do the job and you give them credit for it."

4.35 Management Evaluation

The installation of the main computer system is seen as a major success. Such staff losses as occurred did not present a major obstacle and the manager was quite sanguine about such resistance to change as he encountered. He did not associate this with the computer but with change itself.

"Whenever you change anything, 94% will be for it and 6% will be against. The first time I put a
mixer in the kitchen, the cooks wouldn't use it. Some said they would use [the computer], some said they would not use it and they went."

The manager estimates that the hotel's computer systems are worth an additional £1 million per year in profitability. As with the other two large hotels studied, this is because the computer has allowed the hotel to manage its marketing segmentation.

"The key thing that made the difference was the opportunity to market in a totally different way. Being able to move into the market. Not only the physical thing of being able to handle them but then being able to analyse them and target them and do all that side of it. And then control the activity in such a way that got the results we were planning for. That's the million pounds per year basically."

4.4 Summary of Main Findings

It is apparent that the technical processes surrounding the selection and implementation of computer systems in hotel ZZZ is not superior to that described in either of the other two case studies. Hotel XXX is following a similar route and hotel YYY has equal financial and technical resources. Some less than optimal circumstances clearly exist in hotel ZZZ. The selection procedure failed to identify two major problems that would probably have been highlighted by a competent technical appraisal. These shortfalls were so severe as to lead to a catastrophic system failure shortly after implementation. Despite its stated commitment to development, the computer supplier only resolved one of these problems and a major loss of revenue was only avoided by further capital investment.

User friendliness was chosen as an important selection criterion, but the hotel still purchased a system which could have been highly error prone. The software forced all front office staff to unlearn the habit of a lifetime in the way that dates were represented. The implications for a reservation system of changing 2/8/yy from the second of August to the 8th of February are severe. It is difficult to highlight objectively significant differences in rationale or professionalism between the way in which computers are selected and used in hotel ZZZ and the other two hotels studied. Hotel ZZZ even produces a hand written daily rooms report.
for the general manager, just as the other two hotels produce hand written reports.

The situation of the hotel at the moment presents more or less a ragbag of computer systems many of which are incompatible with each other. The general manager's objective for 1987 is to integrate many of these systems. The financial controller's deficient expertise was not confined to the sales ledger. The computerised bought ledger does "little more than pay bills" and does not manage cash flows. This is to be upgraded in 1986/87. The general manager sees future integration in terms of two major systems, one revenue centred and the other cost centred.

Yet the view of computers and their contribution to the hotel's performance is very positive. Not only is the general manager very committed to this type of technological innovation but his enthusiasm is evidently shared widely in the organisation as a whole.

The attitude of the general manager embodied in his management style is clearly a key factor. Despite his inclination to believe that he has a consultative style, his approach is more paternalistic than participative. This would explain the apparent discrepancy evinced from the grid analysis of element construing. The manager chooses directions for the hotel and then "sells" them to staff. High staff morale is important to him but he is not in favour of unions. However, he has paid a research organisation to survey of staff morale and is encouraging the formation of a staff association "like the one used in Marks and Spencer". The staff association will deal with minor issues such as problems of graffiti on corridor walls.

The general manager was almost certainly the product champion for the first computer installation. His style was evident in the selection and implementation process for the computer. A determination to succeed, strong commitment and close involvement of senior executives meant that early setbacks did not become a permanent deterrent. Circumstances also played a part in this. The high risk of such a major investment in career terms was somewhat offset by the disastrous condition of the manual systems. "It couldn't get much worse", as the manager put it.
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The system was well sold to staff both before and after installation. Change and development have become the normal way of working in the hotel. Many departments are involved in system developments, some of which are then sold commercially. The manager talks of this in terms of an interdependency between the hotel and the computer industry. His experts say what they want, computer experts build on it for the design of systems.

"I suppose we have a certain sensitivity to the way computers work. We will throw ideas at people and say we think there may be a computer solution to that, or a computer solution to that [sic] type of problem."

"It's a kind of sparking off. You get your expert on banqueting and their expert on computers and they spark off each other."

Thus the management role in respect of innovation is active rather than passive. It does not see itself as accepting what is on the market but in actively specifying and developing systems that meet its needs. The manager is delighted for the hotel to be used in that way. The hotel is therefore often used as a development site for new installations.

"I'm first in every time. I'm not hanging around waiting for somebody else."

This has not caused the manager to lose his perspective as a hotelier which is similar to that of other managers interviewed. Where a machine would detract from the quality of job satisfaction or enjoyment of the hotel product he will not use it. Thus in discussion of machine options such as self check out or bedroom based food vending he said,

"I believe I want to make contact with the client. People are lonely. I will resist the route where people sense that they are being dealt with by a machine. That's not hotel keeping, that's something else. With 400 check ins and 400 check outs in a day the girls [on the front desk] have little enough time to talk to you but at least they have more time than if they didn't have a machine."

The spread of expertise and involvement extends throughout the organisation. However, it seems clear that a key factor which influences
successful application of computer procedures in decision support systems is where these are construed as part of the decision making process. The grid analysis has shown that many managers construe the computer as a machine separated from people orientated processes like decision making. In this successful installation, computers are construed as integral to the decision support procedures.

Failures are viewed not as failures of a machine but as failures to use a tool correctly. Such setbacks only give rise to a greater determination to get it right. Thus the failure is internalised and a coping behaviour is found. By comparison managers less successful at innovating with computers tend to withdraw from complexity by externalising. Manager 12's approach is best summarised in his own words.

"I hate it [computerisation] actually in the sense that I keep getting these ------- ideas and I have to do something about it. . . . When I see problems, I look for a means of solving them and the computer is a way of solving a lot of problems in the hotel industry. That's what it comes down to."

Summary of Case Study Findings

The case studies were conducted in order to investigate in depth and to validate, the technique of grid analysis and the results of the survey. Three hotels were studied. XXX is a hotel coming late to computerisation but now going through a search process which will undoubtedly result in a computer installation. YYY is a hotel with a history of operational difficulties finally leading to the unsuccessful introduction of computer systems, from which a replacement system is extracting it in a hesitant fashion. Hotel ZZZ has by contrast a long experience of computerised systems which are perceived as successful by the general manager and important to the hotel's profitabiliy.

From the discussion of decision making processes in chapter 4, a number of important propositions were made. The first concerns the nature of the decision making process itself. These case investigations confirm that the model proposed by Mintzberg et al presents a workable hypothesis for the nature of the process. The adoption process used by each of these
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hotels followed from a crisis, often of devastating import. This seemed to take the form of an actual failure of existing procedures or the potential breakdown of equipment. A solution was matched to the problem very rapidly. There was limited development or investigation of the situation. The role of the general manager predominantly focused on approving or rejecting the advice of a technical expert, and the decision made was merely binary in form.

There is some evidence for acknowledging the importance of a political process in each case. Hotel XXX is influenced by other hotels in its group and by its regional manager, even though the unit manager claims freedom of choice. Hotel YYY's initial system was selected for cheapness against the recommendation of a substantial, professional, technical investigation. Hotel ZZZ may have been influenced in the direction of a company prepared to license a system to a sister division of its parent organisation.

Each of the three general managers interviewed can be regarded as successful. Each is highly thought of by their company. They are each in charge of substantial commercial enterprises, successful if measured in terms of the hotel product and successful in terms of profitability. The extent to which the functionality of their technological innovation, or lack of it, is central to this state of affairs cannot be determined from this research. However, there is no evidence to suggest that in technical terms, the favourably regarded systems in hotel ZZZ are subject to less important shortcomings than the unfavourably regarded systems in hotel YYY. The top executives of hotel XXX have not formed positive expectations.

Four marked differences can be observed between the circumstances of successful innovation in hotel ZZZ and the procedures adopted in the other two hotels.

a) The process of innovation conformed more closely to the recommendations of the electrical machinery EDC reproduced at the beginning of this chapter.

b) Efforts were made to prepare staff in advance of the innovation.
c) Hotel operating procedures were substantially modified to take account of differences that would result from computer based procedures. A proactive, participative approach was taken to what the computer would actually do.

d) There was strong commitment and involvement of the most senior manager, the general manager, who was also the product champion.

Following the decision to adopt computers, managers in hotels make more or less implicit decisions on how to apply them. In chapter 4 it was argued that hotel managers use a great deal of soft data in decision making and this presents difficulties if the process is to be related to a hard technology. The extensive use of soft data is confirmed. The psychological importance of personal judgement, often expressed as feel, is seen as being central to the nature of a hotel manager’s job. All three managers regarded personal contact with the staff, the guests and even the data of the hotel as fundamental to their quality of life. Given this situation, whilst differences in the adoption process are crucial, an even more significant difference can be observed in the application of computers to decision making. Identifiable through the grid analysis, it is evident that the successful innovator in hotel ZZZ construes computer based systems in relation to people based procedures for making decisions. Each of the other two managers construed computers in relation to inanimate reports or other machines.

Following from the discussion in chapter 2, there is no evidence to suggest that changes in technology have been associated with changes in organisation structure. Many existing studies of the relationship between technology and organisation structure by implication reify the technology into something capable of transforming the organisation either directly or indirectly in association with other influences. The controlling influence of the general managers, exercised through a paternalistic management style, supports the case for an action approach to the study of organisations. An action centred approach gives more emphasis to the intentions and interpretations of the human agency, such as managers.

In these examples, organisational change is not allowed to go beyond any
limits which may erode the values and control of senior managers. The notion of the hotel product as immutable over a long historical period, is probably linked to an intuitive perception that however much technology may change, the human needs of hotel guests alter little. For the hotel industry, technology is not an exogenous variable acting as an outside force for change but something which is imported into the organisation at a level and to an extent that does not alter the value system reflected by present structure.

The grid technique is a valuable tool for investigating the way in which technological innovation is likely to be used by a manager. In conjunction with an interview, a grid reveals significant and useful insights into the way a manager construes technology. The grids from managers 10 and 11 have several aspects in common with the grids of the mid computer managers, subjects 4, 5 and 6 analysed in chapter 3. The computer is construed inappropriately in relation to other machines or to decision making. Manager 12 has more in common with the technological managers in the control group, subjects 8 and 9, though manager 12 has construed computers as more integrated with decision making.

Noticeably, none of these three general managers talked about computers in terms of speed of decision making, an irrelevant attribute of most management decisions. "Quality" of information, cold facts to back up intuition and "balance" were more important. However, manager 11 expressed a sense of pressure for faster decisions resulting from computer generated data, reminiscent particularly of the expectations of the pre-computer managers, subjects 1, 2 and 3. In particular he seems to have many elements in common with the manager of another hotel in which unions affect central control, mid-computer manager 5.

The more detailed insights available from the case study do not contradict the main findings of the survey reported in chapter 6. The scanning mechanisms in use are predominantly passive and informal. Perhaps because the technology has been construed as tame, so that computers are seen like telephones or calculators, the hotel general managers seem prepared to make purchases of very complex, technical equipment, costing several hundred thousand pounds without using competent, professional advice. This may be an aspect of the phenomenon observed with technological,
control managers 8 and 9 whereby 'it can't be high tech if I can use it'. In each case, the hotel financial controller had or has assumed the role of expert, even though such decisions are probably outside that person's primary expertise. In each case, it is evident that a competent systems analysis would have circumvented many of the difficulties and catastrophes subsequently experienced.

There was little or no consultation of the work force in each of these cases. Managers in hotels XXX and ZZZ seem to discourage the formation of unions, preferring instead to deal with a staff association. Neither of them report or expect resistance to computer innovation from operators, though some small changes of personnel took place at ZZZ. Hotel YYY is strongly unionised. While this may have had some influence on the situation when the problems of inadequate front office systems were being dealt with, subject 11 admits to no particular influence either way when the new issue of computerisation for food and beverage systems was discussed with staff.

A principal finding of the survey was that hospitality managers, in common with their counterparts in other industries, saw themselves as a major inhibitor of technological innovation. Surprisingly it was manager 12 who expressed his restraining influence most overtly when he said that "I prevent people doing as well as they could." In context he was actually referring to controlling over enthusiasm.

On the basis of these case studies, a number of earlier propositions can be confirmed. The values of senior managers are central to the way in which technological innovation takes place. In this respect grid techniques are a useful tool for examining the way in which a manager construes computers in relation to other decision tools and procedures. Technology of itself exerts no exogenous pressure which affects the structure of hotel organisations or their relationship with the environment. The introduction of computer based procedures does not appear to be associated with shifts in tendencies to centralise or to decentralise decision making and therefore has no overt effect on the balance of power.

Due to the integration of procedures by which hotels operate and through
which management information is obtained, it appears that the direct involvement of line as well as staff managers, will increase the likelihood that technological innovation is favourably perceived. Favourable perceptions are associated with higher morale, an important factor if setbacks are to be overcome with confidence and determination.

Hotels seek to graft technology onto existing procedures in a way that minimises change due to an underlying perception of the immutability of the hotel product. Computer generated data are seen as different in kind from those generated by hand. Decision making in hotels conforms to processes observed in other managers. It also makes extensive use of soft data. In order to render computer generated data usable in a soft decision, it is necessary to transform or humanise the data. One way in which this can be achieved appears to be by simply copying computer printouts by hand. The issue has some most interesting implications for future research into the representation of data generated by more intelligent computer software.
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CHAPTER 8

Case Studies in Computer Usage in Food Management

1 The Problem of Conventional Food Cost Management

Managing food and beverage costs by means of manual procedures represents a major problem for most hotels and restaurants. The difficulty with a food and beverage system is not so much complexity but the huge amount of data that has to be processed virtually every day. Software written for standard stock control is largely unsatisfactory because most of these packages are based on concepts related to manufacturing or to retail distribution industry. By contrast, catering systems both manufacture and sell on the same site. Furthermore, the mapping between a unit of purchase and a unit of sale is not perfect. In retail distribution a pair of shoes is purchased and a pair of shoes is sold. In catering, a litre of cream is purchased for partial use in several end products. Thus the performance of a restaurant cannot be controlled simply from its stock position. It is quite possible to requisition ingredients from the main stores and then to steal them, undetected by a conventional food cost control system. It is also possible to over or under requisition ingredients with consequent impacts on both costs and quality.

Manual food and beverage control systems are subject to flaws resulting from compromises made in order to get any kind of results at all. There are usually six parts to a conventional food control procedure (1).

(a) The chef or food production manager writes a requisition in triplicate for the ingredients needed to produce a forecast number of dishes. Since there is no time to work out quantity requirements against standard recipes exactly, it is done approximately. Over and under orders result. Where shortages are experienced, (many) additional requisitions are written.

(b) The storeroom issues the ingredients, returns one copy of the requisition to the kitchen and sends one copy to the control office. Both the storeroom and the control office maintain a set of index cards (bin cards) which record stocks on an in/out/balance basis.
These two sets of index cards should carry identical balances but differences arise due to clerical errors, partly resulting from the paper intensive nature of the procedure.

(c) At any time, the actual food cost can be calculated by pricing out all the requisitions and adding up the totals. This time consuming process gives the actual food cost. Periodically, usually monthly, actual food cost calculated from requisitions is compared with actual food cost calculated from inventory and purchases. This is regarded as a control point and adjusts the system to the real world.

(d) To calculate the potential (or standard) food cost, the control office costs all the standard recipes for a given week. Typically the exercise takes two or three weeks during which time basic ingredient costs are changing. Some standard costs are therefore out of date even before the task is completed.

In order to keep the costings up to date, week by week as ingredient costs change, an index calculation is used. This is called the market price index and it measures the changes in the total cost of one unit of a number of items. Thus it may record the cost of 1 kg. of chicken, 1 kg. of cod, 1 kg. of butter etc. in week one. Subsequently, the cost of those same items is recalculated in other weeks. Any percentage difference is applied to the costs of the standard recipes. The adjustment represents another source of error since an unweighted index does not reflect the pattern of actual ingredient usage. The method exemplifies an approximation on the grounds of operational expediency.

(e) Lastly, the control office obtains totals for the number of dishes that were sold by each sales outlet, multiplies that by the standard cost and thus obtains the food cost potential.

(f) It then compares actual versus potential cost to evaluate performance. This historical and inaccurate datum is then supposed to be taken as the basis of future food production management decisions.
Part of this process is summarised diagrammatically in figure 32. It is apparent that conventional food cost control procedures, by focusing primarily on inventory, do not support a true control procedure. To exercise control, a procedure must direct behaviour to a performance. The essence of this condition is that decisions are taken at a point when outcomes may still be influenced. When an outcome has occurred, no amount of "control" information can influence it. The procedure conventionally described in food management as food cost control is more properly labelled as an auditing procedure. As such it provides a good example of what Ackoff (2) has called a management misinformation system.

Conventional food cost control presents a number of potentially serious problems for an organisation. Not least of these is the illusion that some kind of control is actually taking place. However, it may also be that a kitchen, having followed standard procedures precisely, is given a historical report which, due to procedural errors and arithmetical approximations indicates that potential cost targets have not been met. Such an outcome is likely to cause frustration and weaken the credibility of the management information system. Further possible dangers also arise. The management of food costs is a simple affair for any food production manager. Alterations of recipes or portion sizes may easily be introduced in order reduce future costs where required. The effect is to punish tomorrow's customers for yesterday's mistakes by introducing undesirable variations in quality. Consequently the marketing position of the organisation is affected.
FIGURE 32

Conventional Food Cost Control Procedures

Original requisition in triplicate from the kitchen

Copy back to kitchen with the issue

Storeroom copy

Control office copy

Special food orders from the kitchen

Purchasing

Food orders

Deliveries

Store room bin cards

Control?

Control office bin cards

Sum of all requisitions
= total consumption costs

Opening stock
plus deliveries
less credits
less closing stock
= total consumption cost

----- Control ? ------
It is apparent that the correct focus of control in a restaurant has to be the standard recipe. Once the standard recipe is agreed between the general manager and the food production manager it becomes the basis on which all costings are calculated and the basis on which all issues are made. Due to the sheer volume of transactions involved, such control is just not possible without a computer since the essence of the problem resides not in its technical complexity but in the sheer volume of data to be processed. Problems of data volume are exacerbated by the actual behaviour of actors, seeking to make the procedure functional. The chef does not have the time to calculate the exact ingredients needed for a particular day's work and so he or she makes up (usually several) requisitions to approximate what will be used. The control office cannot possibly adjust the standard cost of all the recipes each time that an ingredient cost changes and so once again some sort of approximation has to be made when calculating the potential food cost. These shortcomings are detailed by Gamble (3).

Towards a Catering Information System (CIS)

Until 1979, no effective solution to these problems had been identified. It was apparent that the commercial catering sector had not made any attempt to resolve these issues at all. Some efforts had been made in the non-commercial sector, notably that of the National Health Service. For example, in 1971, the South West Thames Regional Hospital Board had undertaken a pilot study of a computerised costing system in conjunction with the Institute for Operational Research and the Tavistock Institute (4).

The study as designed did not deal with the essential problem of providing management information in advance. However, it did aim to cope with the difficulty of manipulating the large data volumes associated with standard recipe costing. The exercise was carried out on a mainframe computer belonging to the health authority using a program written by the Institute for Operational Research. It was not a success. The system was complex in operation since all recipe and ingredient names were coded numerically. This increased the burden of data preparation as batches of cost data were prepared offline for the computer. On its return from the computer centre, data had to be further analysed and assessed by hand. On receipt,
the data referred to a historical period and since several man hours were required to conduct the analysis, even longer frustrating delays occurred before management action was possible. The complexity of the procedure also caused difficulties at the computer centre which found that it was not well equipped to cope with a project of this size and complexity. The pilot study was discontinued.

By 1978, commercial small computers were available which could support a serious application of this type. Although some difficulties were anticipated in respect of limited disk capacities, an approach was made to the South West Thames Regional Health Authority, in conjunction with the Regional Catering Officer involved in the original study, for the development of a new system. Funds were not approved for the project. Subsequently, through contacts with other health service catering officers, contact was made with the Ealing, Hammersmith and Hounslow Area Health Authority. One of the catering officers within this Area had been involved in the early pilot study and had a continued interest in the use of computers for solving some operational problems. Subsequently, in 1979, the AHA provided a budget of £17,000 for the development of a microcomputer based Catering Information System. Three systems were to be developed and installed for initial testing, controlling costs in three hospitals which together had commodity (food) budgets in excess of £4 million.

The original system specification was developed following an analysis of the problems facing these three hospital catering officers. The original hardware chosen for the system was a 280, S100 machine called a North Star Horizon. These 8-bit computers each had 56k of RAM and were selected for a number of reasons. Principally these related to their ability to use the de facto standard operating system of the time (CP/M) which gave access to a large software library. Their reputation for reliability and board based design which made for easy maintenance and the capacity of their twin floppy disk drives which could each hold 400k were equally important. Since word processing was a requirement of the catering officers, each system was attached to a NEC 5510 Spinwriter, solid character, impact printer and an ADM 31 VDU with intelligent screen addressing.
The actual Catering Information System (CIS) was written in North Star BASIC running under the North Star disk operating system (NS-DOS). This DOS is both smaller and faster than CP/M which is important for an application using frequent program overlays. In addition the BASIC facilitated the use of data compression techniques such as bit encoding, necessary if the data files were to be accommodated on the floppy disks. Both the program suite and the data files required for this system were large. Eventually, over half a megabyte of code was developed and total file sizes were to grow to over 3 megabytes. The original systems, implemented on this hardware went live in September 1980. Subsequently on the advent of mini-winchester disks, these were substituted for one of the floppy drives in each computer in 1981.

2.1 The Nature of the Catering Information System

The nature of the systems installed was different in concept to anything that was available at the time. The details of the work that was carried out have been described by Gamble and Kipps (5). The intention was to design a system which overcame the fundamental problems of a manual system both by changing the focus of control and by removing problems of data volumes.

The computer based catering information system was designed as a series of modules, along the lines shown in figure 33. Essentially, the system operates from a file of recipes and their ingredients. As deliveries are made, so the changes of ingredient cost are noted and all the recipe costs are brought up to date. A report may be printed for the manager to show which dishes are affected. When a requisition has to be produced, it is only necessary to enter into the computer the name of the dish and the number of portions. The computer calculates and prints the menu pre-cost, if desired it prints the recipes with the ingredient list for that number of portions and it prints out the summary stores requisition showing the issues to be made. The kitchen gets exactly what is needed to produce the food. Where an over issue is made because the pack size such as an A10 tin is not being split in the stores, the excess is taken into account by the computer when future requisitions to that kitchen are made.
FIGURE 33

Main modules of the Catering Information System

- **RECIPE FILE**
  - Ingredients
  - Recipes

- **DAILY MEAL ORDERS**

- **INVENTORY**
  - Store room
  - Kitchens

- **REQUISITIONS**
  - Prepare requisitions
  - Menu pre-cost
  - Recipe explosion
  - Check inventory

- **MANAGEMENT REPORTS**
  - Actual cost versus potential cost
  - Actual revenue versus potential revenue
  - Trend analysis (usage/costs/revenues)

*Note that purchasing functions were not part of the system design. Input was taken from delivery notes.*
A principle feature of the software design was taken as "user friendliness". Thus in terms of implementation the intention was to introduce the software in 3 phases corresponding roughly to the modules in figure 33. Phase 1 concerned setting up the two main files of recipes and ingredients. Since these were the basis of all further procedures it was essential that they were accurately established. Phase 2 introduced stock control in the main store room and in each kitchen. The use of a control procedure for kitchen stocks is not carried out in manual systems. Phase 3, which followed rapidly on phase 2, is the production of complete management reports.

User friendliness was embodied also in the user interface. A linked list structure was established for the two main files so that any recipe or ingredient could be located by name or part of name in under 2 seconds. Thus operators were not obliged to learn codes in order to drive the computer. Some three years after this system went operational, the University of Wisconsin was to develop its Interactive Foodservice Decision Assist Method (IFDAM), also for use in health service catering (6). The system was menu driven and required coding of both ingredients and recipes. Thus the code for lemonade in the IFDAM system is MBC001 (Menu item, Beverage, Cold, number 1). In the CIS system the entry for lemonade uses the word itself and it can be retrieved by typing any part of that word.

To further simplify operation in everyday use, the design of the CIS separated the system into two sections. The COMMAND section controlled master codes where used, system operation and archiving. The WORKING section was menu driven from a screen display. Thus after setting the date at the command level, the operator would transfer control to the working level. The main working level screen offered two columns, one of actions, one of file names. By selecting a letter from each column such as PR, the operator initiated a function such as Printing Recipe/s. Data security was built into the system operation. Operators could copy onto backup disks without leaving the system and a command level function would print an archive directory. Written in BASIC, this function also provided checks against writing onto the wrong disk.
2.11 Main Features of the Catering Information System (CIS)

The main features of the CIS are summarised in table 38. The basis of the system is necessarily the ingredient file. Many system benefits were to be derived from the preliminary work necessary for organising this file. If good control is to be provided then the units of issue chosen for ingredients should, where possible, use measures of weight or volume. Thus an A10 tin of peas is issued not as in a conventional, manual system by an item such as one tin, but by a unit such as 51bs. The weight of the unit of issue corresponding in each case to the drained weight of the tin. This means that ingredients are entered into recipes by weight or volume which eliminates the need to change recipes if pack sizes change.

The system updates cost of ingredients automatically each time a new delivery is received. As the clerk enters details of delivery notes, the computer is able to make adjustments to the cost of each ingredient, to alter the inventory holding in the main stores and to recalculate the portion costs of each recipe. Ingredients may be costed in two ways. The current cost approach alters the cost of all ingredients to the level of the latest cost. In times of inflation when costs tend to drift upwards this has the effect of giving the caterer a holding gain on the existing inventory. The alternative and more accurate method is to use the weighted mean cost method. This averages the cost per unit of issue between the value of existing stocks and the value of the delivery.

The recipe record is in two parts, the recipe heading describes the recipe in various ways and the second part lists the ingredients. The descriptions in the heading act as the basis for sorting the recipes and provide an additional benefit of a computer based system. This forms a valuable aid in menu planning and cost control. Thus the computer might be used to find all the main courses for which the main ingredient is beef, coloured red and costing between 75p and 100p per portion. For cost control, the computer might be used to list all the recipes which contain butter so as to predict the likely effect of a price change or a commodity shortage.

The system allows ingredients to be entered into recipes using any convenient unit of weight or volume, though naturally for some entries
such as eggs, a measure by item must be used. Ingredients in recipes may be other recipes (referred to as nesting in table 38) and this facility improves the convenience of the system quite considerably. Thus a recipe for 100 portions of cauliflower cheese might have an ingredient which is 50 portions of cheese sauce (another recipe). In some cases these cross reference recipes will call other recipes, cheese sauce might comprise cheese and white sauce.

The first major benefit of this sort of design is that it enables the standard costs of recipes to be brought up to date as frequently as required. Each time a delivery is received, the computer can be instructed to re-price all the recipes and print a report for the manager showing the latest costs per portion and the new recommended selling price or prices. In practice it is poor marketing to change prices every day and such reports are sufficient if generated weekly.

On a day to day basis, the computer maintains a file of requisitions which are a record of the menu cycle of the catering facility. In order to produce a requisition, the food control clerk merely has to adjust the number of portions of each dish on the requisition and then instruct the computer to print it.
LEVEL 1

Maintains a file of up to 1,000 ingredients
Maintains a file of up to 1,500 recipes. Each recipe can contain up to 15 ingredients. Nesting is allowed up to 5 levels so that one recipe may in turn be an ingredient of other/s. In this way up to 75 ingredients per recipe are possible.
Maintains up to 100 requisitions on file. Each requisition may contain up to 50 recipes.
Facilities for multiple pass sorting on any field of an ingredient or recipe record. Thus any recipe costing less than 50p, containing fresh beef and coloured brown can be listed.
Preset sort to find combinations of recipes by specified course type that will provide meals at a user chosen cost.
Recipe recosting using 2 possible conventions for ingredient costs, current or weighted mean. Recipe mark ups are also recalculated at user specified levels.
Possible interface to card reader device for input of patient meal orders.

Main reports

Menu precost for each requisition at current cost levels.
Recipe details in metric and imperial measures for planned production levels.
Stores requisition summarising ingredient requirements and issue cost.

LEVEL 2

Inventory control on main store room updated by every transaction.
Inventory control on up to 6 kitchens, also updated by transaction.
Dynamic re-order point and recalculation and recommended purchase quantities.
Progress chasing on outstanding orders.
Full audit trail of inter kitchen transfers and direct adjustments to any of the 7 inventory points.
Stock reconciliation procedures based on physical counts

Main Reports

Stock reconciliation report for the period - actual versus potential. (In the period since the last formal inventory).
Re-order requirements.
Actual amount and value of inventory in any location at any time.
Audit trail of actual adjustments to inventory for each week.
Dead stock and dead recipe reports.
TABLE 38 (continued)
The Main Features of the Catering Information System

LEVEL 3

Maintains file of ingredient usage by item on a weekly basis for 54 weeks.
Maintains file of recipe usage on a weekly basis for 54 weeks.
Records actual revenue on a weekly basis.

Main Reports
Current week and year to date actual versus potential sales reports
Market price index weighted by actual usage.
Market price index unweighted based on ingredient cost in week 1.
Detailed sales history of planned recipe usage.
In large scale feeding such as welfare catering, military catering or employee feeding, it is possible to contact many potential customers in advance to identify meal preferences. Thus in 1984, an additional feature was developed to allow pre-printed menu cards to be marked by patients and entered into the computer via a mark sense card reader. The value of a rapid order entry system of this type depends on the ability of the catering production system to respond by varying the volume of production. In general this implies a continuous food production system rather than a batch production system. In practice such food production systems have not been encountered and the value of the card reader is more circumspect.

Once the meal order is complete, the computer then checks that all necessary ingredients are held in the stores and generates three lists, examples of which are included as appendix 10.

(a) The menu pre-cost which gives the production cost of the recipes based on the selected costing method.

(b) A description of the recipes using the exact ingredient requirements for each number of portions.

(c) The stores requisition itself.

When the requisition is printed, the computer makes adjustments at all stock locations. With a computer based system, stock control is much more precise than in a manual system since the machine can actually keep track of stocks of ingredients left in the kitchen. To go back to the example of an A10 tin of peas, it is probable that the storeroom will have to issue these in units of weight corresponding to a whole tin. It may therefore issue say three tins, when only two and a half are needed by the kitchen. This excess of half a tin is recorded by the computer as kitchen stock and taken into account (i.e. deducted) from future issues.

Since the computer is taking account of what it believes is held in the kitchen before issues are made, a computerised catering information system requires an extra procedure to verify (check) the kitchen stocks on a daily basis. Interim stock checks of this kind may also be needed in the main stores. Where a direct adjustment to stock figures is required due
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to wastage, spoilage or loss then the explanation recorded by the stock taker is logged by the computer and reported to management weekly in the form of a report. Transfers between kitchens and returns to suppliers from the main store are reported in the same way.

This is the essence of the control system and marks the real difference between the manual and the computer based system. True control depends on directing performance to a plan and this can only take place before the event. Once ingredients are issued and used, nothing can call them back. At best, a conventional system can record errors but with a computer based system almost the exact quantity of ingredient is actually issued. Any excess going to the kitchen is less than one unit of issue, which is recorded by the computer. The point underlines the importance of making sure that recipes are held on the computer in the correct form. Quality control in terms of consistency may also be improved by a catering information system since a computer neither omits or under issues ingredients.

From time to time, a normal stock reconciliation must be performed. Although the computer allows for frequent and accurate spot checks since both the volume and value of stock holding in the main store or in any kitchen can be displayed at any time, periodic reconciliations between actual and computed stock holding are needed. The CIS is designed to allow a stock reconciliation in intervals of whole weeks and stock reports are produced for any intervening period since the last report. However, the system "forces" a stock reconciliation at the beginning of each new accounting year (April 1st. in the National Health Service) whenever that might occur.

The CIS also produces benefits in managing the value of stock holdings. Not only can the computer produce figures for the value of inventory at any time, which is very difficult to do with a manual system but it can adjust the volume of stocks dynamically according to the level of business. Thus instead of keeping a fixed minimum and maximum level for each item as is usual in catering organisations, it can adjust the reorder point and the order quantity to the actual level of use.

Any food control system, either manually operated or computer based, is
intended to provide management with information which will permit a comparison between planned and actual performance. Bearing in mind the fact that reports in themselves are of no value unless they provide a guide to decision taking, the format of these reports was designed so as to differentiate two types of error.

(a) Planning errors: Errors in forecasting are the fault of management itself since this is a management function. If the kitchen are told to produce 300 portions and only 250 were sold the blame for wastage should not be placed on the shoulders of the kitchen supervisor.

(b) Operational errors: These errors are due to a failure to follow standard procedures. Perhaps too many ingredients are used or perhaps there were errors in the cooking method or the portion control which resulted in over or under use of ingredients.

Food control reports produced by the CIS identify differences between planned and actual costs on both a weekly and a year to date basis in such a way that the direction for management action is indicated.

In his categorisation of the intelligence of management information systems, Zannetos (7) has identified 8 stages. The first three stages are very primitive. The capacity simply to store data, then a capacity to classify it and thirdly an ability to extract differences. Stages 4 through 6 represent a significant advance in the nature of the modelling process and in the interpretation of outcomes. Stage 4 begins with an association of cause and effect. Stage 5 introduces simple heuristics where a search for cause is initiated by from within the model and stage 6 assumes that the system has the capacity to infer probabilistically and to challenge the model itself. Finally, for stages 7 and 8 he suggests models that can cope increasingly with conditions of partial ignorance and make inferences from incomplete information.

The scheme is useful as a measure of the development of a management information system. On Zannetos' scale, a conventional food cost control system would be measured at level 3. It uses primitive operators such as aggregation and it can extract differences in quantitative magnitudes. However, its output cannot be classified as information. The CIS takes
this to level 4. It has an inbuilt knowledge of the relationship of inputs and outputs (ingredients and recipes) and can associate differences between actual and potential outcomes with cues for management action by separating planning from operational variances. It is not really an intelligent system and its outputs do not actually constitute information since they require further processing by the manager. However, the CIS does represent a significant improvement in the model of the control process and a move towards the development of an intelligent system.

2.2 The Information Environment of Hospital Catering Officers

"... a social talk with a patient is not considered as work. Work is seen as working with your hands. Moreover, when there is a shortage of staff, hospitable behaviour is soon experienced as in conflict with the 'real' work to be done. The patient should have perfectly clean sheets, should be temperatured [sic] at exactly 7.30 a.m. and 16.30 p.m. and his food should be supplied in the shortest possible time. That the patient is not feeling comfortable and at ease is perhaps seen as important but also as an unsolvable problem." (8)

This extract from a paper presented to the International Jubilee Conference of the Hague Hotel School summarises the limited objectives that are often considered for institutional catering systems, especially those in hospitals. Whilst Mumford (Emily) and Skipper (9) amongst others have noted the importance of the social aspects such as catering services to patient recovery, hospital administrators are apt to measure the performance of the catering services merely in financial terms. Indeed, reference to the objectives of the National Health Service under which hospitals were working in 1980 (10) reveals no explicit statements in respect of the prevention of sickness or in respect of rapid patient recovery, though this may be subsumed in such worthy ambitions as "improved approaches to health care."

This limited perspective for the catering service is reflected in the even more limited information environment that surrounds the provision of these services. Thus for the Area Health Authority in which the CIS was to be installed, cost information was provided to each District manager from a regionally based mainframe computer, located remotely. The cost
information produced for the catering managers took the form of a historical analysis of expenditure designed to meet the need for public accountability rather than the need for management information. Its published statements were designed to meet the requirements of a document produced by the Department of Health and Social Security and took the form of a computer printout which provided crude comparisons with budgeted expenditures.

No analysis of any variance was provided for whatever reason. Thus a hospital with a budgeted provisions expenditure of £7.50 per patient per week and a forecast number of 400 patients would be allocated a weekly budget of £3,000. The financial appraisal was based entirely on this figure. If the hospital were to spend £7.89 on 380 patients or £7.14 on 420 patients the system would report a perfect result. Should the hospital spend £3,150 on 420 patients, an apparently acceptable result since it meets the standard cost target, the hospital would be penalised for running over budget (11).

This financial report was produced by the regional computer centre six weeks after the end of each month. Even had the report contained usable management information, in a worst case situation ten weeks would have elapsed since the error occurred and the report made it known. In addition to this enormous time lag, the report further hindered management action by producing no analysis or breakdown of expenditures beyond summary totals. So for example, it was not possible to identify whether the cause of an overspend was due to increases of some or all commodity costs or whether it was due merely to an increase in patient numbers.

Some catering managers, such as those eventually associated with the pilot installations of the computerised CIS had designed manual procedures to attempt to offset some of these problems (12). Whilst these offered a considerable improvement on the management information provided by the regional computer centre, they were still subject to the problems of any manual food cost control system. A large number of clerical activities had to be undertaken to produce cost data, these were not only error prone but also time consuming. No standard costs were computed and there was no real control over what was requisitioned. In a large hospital the production and costing of requisitions alone took 16 man/hours per week.
Managers themselves were involved in both producing and analysing the information which took them away from other management duties. There was still a time lapse of approximately one week before all cost information could be collated and circulated so that in an overspend situation, a second week of cost over runs would occur before managers were alerted to problems.

Further difficulties were encountered by catering managers because of the organisation structure under which they had to work. A highly differentiated, strictly hierarchical and bureaucratic structure left the catering manager with no direct control over purchasing or maintenance. Arbitrary purchasing or inefficient maintenance could both affect the nature of the resources available to the catering department. Food production and service systems, designed by laymen, had to be operated in accordance with the constraints imposed by medical staff.

These issues came to a head in one particular Area Health Authority towards the end of 1979. Based on inadequate financial data (13) the Area Treasurer proposed a system of standardising patient budgets and achieving a 50% mark up of expenditures on staff feeding in accordance with government guidelines. The latter would have represented a movement from a situation in which staff meals were actually subsidised by 5%. This move to put pressure on the District Catering Officers led to a series of meetings between the Treasurer’s staff and the caterers.

At the time, two other computer based costing exercises were under way in the Health Service. The first of these taking place in the Glamorgan Area Health Authority (14) had shown substantial improvements in cost recovery by the simple expedient of repricing recipes on a weekly basis. The second, carried out by the work study department of the Cambridge Area Health Authority (15) had achieved a similar result also by repricing recipes more frequently. In a single example, the latter had shown that under pricing a recipe by 1p per week led to an annual loss of some £7,200.

Both of these experiments had been run on expensive minicomputers. Thus the approach from the University of Surrey to develop a system based on a microcomputer offered a solution to match this particular problem.
However, it will be recognised from the foregoing explanation that the problem to be addressed was not so embracing as that affected by the installation of a hotel front office system. Indeed, the perceived objective of the system as it was initiated was merely to provide a more economical basis (than a minicomputer) for recosting recipes. In the discussions and investigations needed for the systems analysis this objective was expanded into other roles. However, the catering information system was limited by design to planning and controlling the food production operation.

In this respect it can be viewed very much as a sub-system peripheral to the catering department’s main objective - that of producing food for patient feeding. Food production would and could continue without the functioning of the CIS. Indeed, to extend this further, the catering department itself could be seen as a secondary activity in each of the cases described below. A hospital may see itself in the business of curing sick people and feeding is perceived as an incidental requirement in this process. This situation is quite different from the cases described in chapter 7. A hotel front office system is central to the business of the hotel. Without a front office system the hotel cannot no longer function. Without the use of computers, the front office system cannot be managed as the hotel would wish.

A further difference affecting each of these cases concerns the nature of the organisations. In each case, the manager attempting the innovation is a middle manager who does not have the authority to influence the organisation broadly. Their actual authority does not go beyond the bounds of the catering system. In cases 4 and 6, the managers did not control even those departments with which they worked directly such as purchasing. In case 5, the innovator was a staff manager working with line managers of similarly limited discretion. In all 3 cases, the organisations concerned were non-commercial and highly bureaucratic with well defined roles and areas of authority. Cases 4 and 6 were highly unionised and all 3 were bound by strictly defined procedures. The introduction of a computerised system was not perceived by senior management as a brief to change any of these things.
Indifferent innovation may seem a curious choice of title but is probably the most apt for case study 4. In 1979 there were in fact four hospital Districts under the control of the health authority which negotiated for the installation of the catering system. One of these chose to opt out of the work on the computerised catering information system though he was to install a machine using another program five years later. Manager 15, described in case study 6, was the driving force behind the installation work. Of the remaining two, neither installation could be described as successful in terms of effective utilisation but equally neither was completely unsuccessful. Both systems were to remain in use for several years. Eventually in the political upheavals surrounding the third major reorganisation of the national health service in twenty years, the third manager resigned her post. Manager 13 remained and, 6 years after the installation of the system, occupied more or less the same post of managing the catering services for an 800 bed teaching hospital in west London.

The CIS installed in 1980 was used for 5 years and was replaced, with some reluctance in 1985 when the company which had undertaken to provide hardware support withdrew its services. During these 5 years the system was to function continuously, as required, but almost peripherally to the workings of the catering department. It might therefore be inappropriate to describe it as unsuccessful because it did what the manager wanted it to do. On the other hand, it actually affected the operation of the catering department very little.

The main initiative for the installation described in case study 6, lay with manager 15. Manager 13 joined this exercise almost as an observer. All the catering services in the Area were under common pressure from the treasurer. Although the cause of the problems in each unit differed, since a common threat was posed three of the District managers chose to adopt a common solution. In this case, manager 13 was able to proceed because the funding for hardware came from the Area and not from his own District. He therefore needed little by way of local approvals and was able to obtain a computer without the need for extensive internal political activity.
3.1 Background of Computer Usage

Like other department managers, manager 13 was the recipient of computer generated financial reports. However, at the time that the CIS was installed in 1980, he had no formal training in the use of computers and no direct contact with their use. His office was remote from the installation itself and contained little by way of office technology. Six years later the situation is unchanged. His office is remote from the microcomputer which he would be unable to operate properly if asked to do so. He has only a calculator on his desk and a telephone to one side. His contact with computers has not visibly increased.

3.2 The Attitude of the General Manager

Perhaps the key to manager 13's behaviour is the almost passive role which he appears to have adopted within the bureaucracy of the hospital and the health service. By contrast with managers 14 and 15 who seek actively to manipulate the organisation politically this manager, a man in his early 40s, merely seems to be carried along by events. That he has survived in the same role for at least six years is evidence that such behaviour is both acceptable and successful. He sees himself in a position of little authority and less power.

"I see myself as the custodian of the department able to make minor decisions. That's a better title than manager. I could take say, 1 person out of the [food] service if there were 3 because I would be my own authority to proceed. Usually, I have to get authority to proceed and then I must discuss. . . .

We always say that we're fourth on the list of anything. If there's money being spent it's offered first of all to the medical services, nursing services, personnel services and any other services. Oh, catering might want something. We have to fight for anything we want. But, it's a service that's in the forefront of basically everything and certainly in the forefront of any criticisms that may be laid."

A manager who does not manage may appear to be a contradiction in
terminology but a reconsideration of the process by which problems are recognised, particularly in the context of a bureaucracy, may explain why such a passive manager may be successful. It has been argued that the process of managerial problem solving is often linked closely to matching solutions to problems. In the cases discussed in chapter 7, the hotel managers matched solutions to problems thrown up by crises. These crises were usually the result of poor organisational adaptation to the external environment. A non-commercial bureaucracy as large and important as the national health service has no requirement to be responsive to its external environment defined as invalids. Its funding comes from government. Its users have no direct control over that funding. In any event its customers usually encounter hospital services in a condition of dependency and are not generally inclined to challenge the way in which such services are provided at the point of contact. The procedures of a hospital are therefore designed to respond to the pressures of internal coalitions and of government. It is the internal organisation environment rather than the customer environment that stimulates actions. Perhaps this is what Starbuck and Hedberg had in mind when they wrote,

"An organization ordinarily generates potential actions without the stimulus of specific problems, just because an organization is designed to generate actions." (16)

In a similar vein, Wildavsky (17) has suggested that solutions give rise to problems, rather than vice versa because the past experience of administrators has warned them that not all solutions can be easily implemented. Existing solutions do not appear to be subject to the same risks as those untried. Thus the passive behaviour of manager 13 can be seen to fit well in an organisation where members have been socialised into a commitment to existing conditions. As the manager of a department that is not seen as central to meeting the primary objectives of the hospital, a behaviour pattern that seeks to mediate between current "actions" and the workings of his department is probably quite apt. It does not however provide a fertile base for technological innovation.

3.21 Knowledge of Computers and Scanning Mechanisms

The catering manager has very little knowledge of computers. His scanning
mechanisms are mainly passive though where his interest is heightened he will scan more actively for particular topics. Information is "passed through to him" by various committees of which he is a member. Government circulars from the Department of Health and Social Security (DHSS), pertaining to catering, are passed down through the hospital administration. Additionally, he receives information from his trade association, the Hospital Caterers Association and through trade magazines.

Most of the technology that attracts his interest is more related to catering products than to administration. At the time of the interview his concerns were with cook-chill systems about which he had been sent some descriptive literature. The technology of cook-chill in hospital catering is over 15 years old so that he could not be said to be thinking of an untried solution. In scanning the material with which he is presented, he seems to preclude technology in the form of computers as being "outside of his area", though he had recently received a report from a fellow hospital caterer summarising the features of various computerised catering systems.

When the CIS was installed there were no background information services to provide data on catering systems as a matter of routine. Manager 13 did not seek such information actively though he did join in the visits to other sites. Specific information on computing is now passed down primarily from the DHSS though additional material is circulated by the regional computer centre. Due to the growing application of small computers to hospital catering administration, there is some monitoring of usage by the DHSS so that a limited exchange of data takes place.

3.22 Grid Elicitation

As encountered elsewhere, the manager's reaction to being asked to give examples of decisions was to picture his job in terms of constant decision making.

"Bosh! I could probably give you a hundred because it is basically making decisions all the time."

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Decisions as discrete events were however hard to isolate. The manager seemed to perceive two main processes. One of these processes was to do with day to day decision making concerned with running the catering department. He was in fact trying to distance himself from these activities so as to delegate more work to his assistants. The second process concerned the important decisions referred to in the last quotation. Given his self description as a custodian, his powers to make decisions on these matters is actually very small. This is a position in common with managers 14 and 15. Whilst the catering managers may exercise some direct authority over their own line operations, acting as the interface between their department and organisation as a whole is very difficult for them. Catering is not of primary importance to their organisations and their direct influence is small.

Manager 13 gave examples of decision processes with which he was involved rather than of decisions that he had actually made. In describing the tools and techniques that he used in these situations a picture emerges of someone who seeks to influence the course of events incrementally in a style more reminiscent of a staff than a line manager. This seems to be true even for decisions that affect only his department. The hospital is heavily unionised and the catering staff union appears to restrict manager 13 more extensively than was the case for manager 15. Even decisions limited to the boundary of his department often have to be discussed with unions. Thus,

"I would think that 90% of my job now involves some form of discussion."

Discussions either with groups or with individuals occupy most of his time. "90% of the documentation" for these discussions appears in the form of reports with financial implications. It was only when he was prompted that the manager added 'personal judgement' to his list of decision making tools, perhaps indicating that he does not see himself as an important actor in the course of events.

Two themes seemed to emerge during construct elicitation. The first of these is a differentiation between things that were continuous (like
discussions) and things that were discrete (one off decisions that could be made). The other seems to be a distinction between elements that trigger actions such as reports and discussion and reactions that have been triggered. This is an end-means construct and manager 13 had some difficulty in distinguishing the two. A report may trigger a further report. A telephone may bring an incoming instruction or be used to convey an outgoing message. However, a surprisingly large grid emerged and despite some initial difficulties in capturing the phraseology that best described each construct, the manager construed elements with little need for further clarification.

3.23 Definition of Technology

The initial definition was very short.

"Well, a brief analysis would be something new".

When asked to explain, the manager expanded the definition in terms of any material technology which had not been encountered before.

"I suppose that technology basically, in the way that we look at it, would be something new, technical. In other words, involving some form of machinery or equipment. As a caterer one would say there is technical advancement in food. That’s something we’re aware of all the time because we’re growing up with it. If someone actually said, ’look, does this need technology in the department regarding this?’, well then fine, I’ve never actually seen that piece of equipment i.e. the Regethermic cook-chill trolley. To me that’s new technology."

The notion of a tool or decision aid did not emerge as it does with managers 14 and 15. The idea that any unfamiliar (new) machine is technological carries a perception of complexity and perhaps threat which the manager was to reinforce later.

3.24 Grid Analysis

The full Monocle analysis of the grids in this chapter are included as appendix 11. The cluster pattern, shown as figure 34, tempts a comparison
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with figure 29 of chapter 7. There are some similarities between manager 10 who distances himself from computer technology and manager 13 who has kept apart from his own department’s computer for many years. Broadly, both managers have an end-means pattern of construing. There is relatively little differentiation between constructs. In each case there are three bands or levels into which elements are tightly grouped.

The constructs of manager 13 fall into two groups.

PART OF ME and TRIGGERS ACTION are linked to
PROBLEM RELATED then
USE ONLY WHEN NEEDED and finally
INTEGRATED, all of one.

PART OF ME is used in the sense of live all the time. This seems to be a set of constructs to do with responding to problems as required. The other set are more to do with making decisions.

OUTCOME, PASSES INFORMATION and METHOD OF JUDGING are construed at the same level and these are linked with MAKES DECISIONS.

Thus the decision making elements are those related to this second set. In a fashion similar to that of the other two catering managers, manager 13 seems also to have construed the elements in two quite distinct (separate) groups. The first set are primarily outcomes and ways of passing information and making decisions.

DISCUSSIONS 1:1 and DISCUSSIONS 1:_MANY are closely linked. However, they are not construed tightly with the other decision tools, CALCULATOR, REPORTS and (loosely) STAFF ROTAS.

The other set of elements which includes the personal computer, are used more intermittently as required but they are more PART OF ME, part of the manager’s every day job.

DIARY LOG and the INTERNAL MAIL system are closely linked and join ELECTRONIC MAIL, which in turn is construed with two other communication systems, the TELEPHONE and the BLEEP SYSTEM.

The SMALL COMPUTER as an electronic device links loosely to the latter as then does PERSONAL JUDGEMENT.
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FIGURE 34

Indifferent Innovation - Manager 13

A District Catering Manager in the National Health Service

Cluster Analysis of Grid by Program Monocle

Cluster Presentation of Grid
Subject 13 - 07.86

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The diary log is the way in which the manager schedules his personal use of time. The internal mail is important to him for circulating memos to his staff. Electronic mail is a device that he would like to have to make this process more efficient. The second set of elements are primarily a communications and scheduling set. The computer and personal judgement are only loosely linked to this group mainly because they are seen to be more active in making decisions than the other communication devices. However, in other respects these elements MAKE THINGS HAPPEN, allow EXAMINATION, GO ROUND THE CIRCLE and are ACTIVE, DOING THINGS like the other problem related devices.

3.25 Grid Evaluation

Unlike managers 14 and 15, this manager does not construe personal judgement in relation to 1:1 discussions. Like the computer it is construed almost inappropriately in relation to other elements. It may be significant that personal judgement is seen in the same way as the computer, perhaps suggesting that this too is not an important element. Personal judgement differs from the computer in being isolated (from the cycle of events), retains judgement and neither passes nor receives information.

It is evident that the manager is able to construe some elements very firmly, basically those that involve him frequently. These include discussions and communications. Other elements show a less clear pattern. Grouping personal computers and personal judgement in the same set might be taken as a positive stance in regard to the use of the computer for decision making. However, manager 13’s work is mainly bound up with discussions and reports to which communication devices are only very loosely bound. The grid is therefore presenting a picture of a manager who sees both judgement and computers outside and distinct from his main stream of activities. Thus the link between the two shows not that the computers will be used to support personal judgement in making decisions, as is the situation for successful innovators with computer technology, but that neither is construed to have a role in this respect.
Manager 13 expresses some diffuse expectations that computers will somehow make his job better or easier coupled with an uneasy suspicion that computers may also take things away. In verbalising these attitudes, the manager is demonstrating more self knowledge than either manager 10, who is creating conditions in which a computer system cannot do well, or manager 11 who prefers to perceive the computer as something magic in the hands of his magician, the accountant. Thus when asked if he thought computers would bring him personal benefits in his job he replied,

"Yes - I'm using just that short word, yes. If I try and identify what, I don't know. It really depends where my field of activity is going. Am I looking at expanding the service, reducing the service? Looking at new technology or methodology [sic] of running the service?"

These sentiments provide another view of someone waiting for an action to be generated by the organisation. A great deal of uncertainty surrounds the manager's position to the extent that he cannot predict either his own job or that of his department. The computer adds to that uncertainty. It seems to "hold promise without being sure that the promise is what I want."

In this context the computer is perceived as threatening. The manager is afraid that he will not be able to keep up with the technology and that it may threaten his quality of life. Indeed, computers are imbued with the anthropomorphism of a malevolent, hungry child.
"Like most things that have to be done it has to be mothered. Mothering it means you have to spend time. So, while you're doing that you're inactive on everything else and I speak purely and simply as a catering manager. You'll get a totally different view from another manager. But as a caterer I see myself basically as identifying shop floor problems and solving them. In other words I produce a semi-personal type of service."

The manager would like to see computers allow him more time to spend on what he should be doing, being a creative manager. Instead, they are seen as something of a task master. Such demands are contrasted sharply with catering technology such as the cook-chill system. Once it is up and running the cook-chill system can be left to other people, it does not demand daily management attention, whereas the computer system makes daily demands on the manager. The threat from a computer system can therefore be likened to the threat from the organisation. A working computer system, as opposed to one which operates peripherally to the department's function, will generate actions like the organisation generates actions. The manager will then be driven to respond. Worse still, these tasks cannot be left to go away. The paper work on his desk can be left or maybe delegated but the manager seems to feel that computer related work will simply wait for his return. In this respect he sees the computer as a management taskmaster.

There is also a contrast to be marked between future expectations for computer systems and the role to which the existing system is confined. A present day computer system is seen as a clerical device. The manager considers himself fortunate in having plenty of "clerical aid" and this reduces his need for computers. Nor is he dependent on his present computer for information that relates to what he does now. He can "draw that information from anywhere".

It appears that manager 13's attitudes to computers are coloured by his perception that a computer based procedure is supposed to provide management information. However, he is concerned that he may not be able to use (or even understand) that information. A computer system may also impose an undesirable structure on the way he does his job. The problem is contained by introducing a computer into the department but restricting the way it is used. It is confined to narrow clerical operations of
little import. This allows the manager to point to his use of the machine as a person who has available progressive, new technology, without being threatened by the need to make better, daily decisions. The practice has continued for six years.

3.3 The Nature of the Innovation Decision Process

The pressures which led to the innovation decision by three of the catering managers in the Area Health Authority are described more fully in case study 6. Despite the elapse of nearly 7 years, manager 13 claimed to remember the circumstances surrounding the introduction of the CIS "very clearly". Unsurprisingly he recalls the innovation process being based on "discussions and reports".

"I didn’t think at the time that computerisation would help me with my present problem but I thought my problems were beyond computerisation. They were actual structural problems i.e., what we’re currently sorting out now, centralisation of services, rationalisation of services. But, through my own personal interest in the computerised field, I saw it as the modern technology and a requirement of the future catering. And I just wanted to get myself in as soon as possible to start finding out its adaption and whether or not it’s what I would require."

3.31 The Nature of the Problem

In 1979, an audit report criticised the catering service of the Area’s hospitals as being high cost in comparison to other units. The comparison was ill founded in that it took no account of patient work loads, the medical needs of the Area in relation to others or even the nature of the hospitals themselves but it was sufficient to bring political pressure to bear at a time when hospital costs were being criticised by government.

The real problem for manager 13 was that of organisation structure, an issue untouched by the computer proposals. However, it was clear that the forthcoming reorganisation would adversely affect those catering managers who were not seen as responsive to change. In the 1974 reorganisation, many catering officers had been put in the position of having to reapply for their own jobs. This practice was imminently to be followed again.
3.32 The Search Procedure

In discussion the caterers agreed that faster information was the answer to both these problems. Faster information would give the treasurer’s department more numbers more quickly. It would also make the managers look very progressive since no other hospital caterers were using microcomputers at the time and no other computerised systems offered the same degree of completeness. Manager 13 recognised straight away that facilities for better cost control were not pertinent to his problems.

"I personally didn’t feel that at the time. But I went along with the methodology [sic] of that knowing that once we’d agreed with the Area Authority that we as three units required this sort of technology to help us, that I’d get it through that way. So I used that as a vehicle basically to get computerisation."

No search identifiable as such actually took place. Manager 13 was using the vehicle of other people’s problems to acquire for himself a computer. The computer as a decision tool was irrelevant to what he saw as his problems. The computer was needed as ‘window dressing’ for his own position and his only chance of obtaining such window dressing was to follow the route established by manager 15.

3.33 Staff Involvement, Consultation and Training

In the circumstances there was little internal consultation. Administrative approvals were sidestepped since the funding was to come from outside the District. Union approvals were not needed since only one person was to use the system originally and there was no serious intention to make the system go live.

The intended user, a sixty year old woman who had the job of catering clerk was firmly opposed to the computer and anxious that it should not be introduced without a long period of training. She was advised by the manager that she would get no training and that she had better get used to the idea of the machine.
On site training was conducted on behalf of all three hospitals at the site run by manager 15. Although clerks were sent to this training by the third hospital in the group, by dint of some administrative mishap this elderly lady was not instructed to attend. Thus of all the system’s users, the oldest and most antagonistic received the least training of all. Subsequently she was to visit manager 15’s installation several times and was to be trained by her staff.

3.34 Implementation

Predictably, the implementation was badly handled in almost every aspect. The equipment itself was housed in a large dusty room, the leaky roof of which admitted both rain and pigeon droppings. These problems coupled with inadequate operator training led to frequent machine failures. No discussions took place with kitchen staff on the nature of the ingredients and the recipe formulations. On the (unfounded) assumption that contract purchasing would result in similar patterns of ingredient use in the two hospitals, manager 13 took as his ingredient file the data generated by manager 15’s staff. As manager 14 discovered when he tried to provide ready made recipe and ingredient files for army catering units, this served to introduce yet another source of problems. The task of modifying, deleting and adding ingredients proved much more onerous than the well planned exercise of preparing the data carefully in advance as shown by manager 15.

Even the system concept was unsuitable for manager 13’s hospital. The CIS was designed around the idea of a single, central store issuing as a control point to up to six production units. Manager 13 had no store for catering supplies alone but six delivery points and six storage points issuing variously to 3 kitchens, six dining rooms and all wards. The organisational confusion resulting from this arrangement, linked to a purchasing department outside the catering manager’s control, underpinned most of the operational difficulties faced by the catering department. The scope of the problem in political terms can be measured by the fact that it remained unresolved six years later and that “centralisation and rationalisation” were key issues in 1986.

The computer seemed to have some effect in stimulating an awareness that
information could be actively sought and used for solving problems. Thus it was used by the catering manager's office for occasional costing exercises. As a side effect it also heightened the awareness of kitchen staff that standard recipes were meaningful. Prior to the computer no-one in the kitchen questioned the DHSS standard recipes. Manager 13 created records based on his own modifications of these recipes, in turn related to what he thought was standard practice in his hospital. He did not consult the cooks. When computer printed recipes were sent to the kitchen this created a reaction. Cooks now questioned recipe formulations in a way that they had never "felt entitled to question" the DHSS recipe book. This astonished manager 13 despite "the surprising number of mistakes in that book" which he encountered when checking the recipes. He seems to have assumed that since the printed standard recipes were never challenged, those from the computer would be accepted equally passively. He clearly did not perceive the computer as an active management tool in the same way as his staff. Some antagonism to the machine from cooks is still expressed.

Surprisingly, the system was to survive these circumstances. It was never to work well or properly but its work on recipe costing and food requisitioning proved useful. Its survival can be attributed in part to the tenacity of the catering clerk herself who determined to resolve the problems of unreliability. In practice such efforts were something of a hindrance in that they took her into areas peripheral to the machine's main task but it did enhance her will to master its operation. The recruitment of a younger assistant catering clerk who showed some aptitude for working with the computer was also to help.

Nor did these circumstances of minimal success seem to give rise to any corporate learning. Four years after installing the CIS computer, the catering manager spent £4,500 on purchasing the hardware and software for a mark sense card reader. The political circumstances were again similar since the venture was undertaken in collaboration with the third hospital in the original group of three. The intention was to use the card reader to collate patient meal orders. Two years later, in 1986, it had never been used. Manager 13 remains phlegmatic and is convinced that the money was well spent. The card reader provides for an eventual expansion.
In late 1985, manager 13 was offered a transfer from his original computer to a more recent model for a minimal £1,000. Again he was able to circumvent the administrative procedures by presenting the transfer as a recurrent (as opposed to capital) expenditure to his local finance officer. Again, no formal search procedure was used to determine whether the choice of machine was apt and in the event the replacement software proved much less easy to use. Recipe and ingredient names were replaced as search keys by code numbers. Creating a food requisition, a task so straightforward on the original system that, "any of my staff could have done it", was now so complex that three separate operator sequences were needed by someone with a close knowledge of the system.

Despite the fact that neither the original CIS, nor the replacement system were designed to cope with a multiplicity of delivery, storage and production points in quite such profusion, the option to discontinue the computer system was not seriously considered. Instead the view was taken that a replacement was eventually inevitable and that costs would only rise. Once again, enormous difficulties surrounded the establishment of the basic data files. The work load associated with transition and the greater complexity of the new system are seen as "a big step back." In retrospect, the original system is regarded as having been on the verge of working. The transfer to the new system is considered to have set the department back 18 months. Such a position would be difficult to sustain objectively. It seems probable that the application of the department's computer system would have been no more effective even had the original system been continued.

3.35 Management Evaluation

Manager 13 is not basically unhappy with the human and financial investment in resources that his two computer installations have incurred. In the way that some hoteliers take a historical perspective of the human needs being met by hotel services, he seems to take a very long term view of changes in his organisation. When he committed his department to a computer in 1979 he was of the opinion that eventually his organisational problems with supplies would be resolved. Six years later in 1985, he saw even more clearly the move towards the creation of a divisional (now equivalent to an Area) supplies office that would allow his replacement...
system to work properly. By 1987 this change will have occurred and he is convinced that his computer (complete with the unused card reader) will be needed to manage the future cook-chill system.

"I saw the need to get into computerisation at those very early stages to find out basically what it was all about... I had a great difficulty in calming --- [the elderly clerk] down, because she kept saying, 'we should be on level 3, and we should be on level 4, and if we don't do this today, and the kitchen never gave me that so we've lost this-information', you know. And I had to take on the burden for her and say, 'OK, we'll try and sort it out'. Then I'd go back to my office and say, 'It doesn't really matter', because I wasn't really bothered and we let them use that tool and think that it's operating. I basically wanted this period of time to be able sit down and say, 'Well, is the computer going to give me something in another year's time?'. And at this moment in time all I can say is it's going to aid me with cook-chill... in 1987."

For six years manager 13 has used two of his staff to operate a computer system so that he could maintain an involvement with computers, in the expectation that one day they might 'come in handy'. In the circumstances it seems improbable that they ever will for this particular individual.

The present system was not evaluated before purchase but its installation is justified on the grounds of the ease of the replacement decision and the fact that it allows manager 13 to exchange ideas with colleagues. He has never done so and could only think of one other manager who is using the system after a pause. This happened to be the manager whose report on computerised catering systems was on his desk, whom he has never met.

When asked if the original CIS was actually helpful to him, he replied,

"Yes, it was as helpful a tool as probably a calculator was. If we had a problem we could look it up and find out what the problem was. It initially helped us in being able to identify the need to give information and how to get information."

This seems to have derived in part from the ability to actually manage aspects of his food production operation that the computer gave him.
through a control of recipes. The system was not used as a vehicle to introduce other changes nor does it appear to have had an effect on jobs. A commitment given originally to the health authority that the computer would reduce clerical labour was never met and the authority have now forgotten the promise.

"I never actually visualised it working here from day one as [manager 15] did because I didn't have total control of the situation like she had."

It is difficult to assess whether the perceived difference in levels of control was real and to what extent it might have been a function of differing management styles. Certainly, manager 15 was a much more active manipulator of the organisation than manager 13. Manager 13 is looking forward to obtaining more control and sees the establishment of a central stores and possibly the privatisation of his hospital's catering as giving him that control. He has secured an agreement with one of the two unions with whom he has to negotiate to produce an in-house tender for private catering.

"At this point in time [the computer] system is peripheral. It's having no effect. . . But when I've got total control as a private caterer . . I'll be able to say, 'right, no longer will I discuss with A, B and C whether to change the system like we're currently doing with the dietetics now."

Although he remains convinced that the computer system would have provided him with useful management information, manager 13 acknowledges that "it's never had its head'. It has never been allowed to run properly because the systems backing up the computer have never been right. These problems are probably associated with a lack of procedural structure but the manager ascribes them to the computer's lack of flexibility. "Catering is not a science."

3.4 Summary of Main Findings

Manager 13 is not a man who seeks change but who foresees change occurring due to the actions of his organisation. He wishes to minimise the effect of that change on himself and on his department. The installation of a computer in 1980 was undoubtedly a political act, designed to protect his
position in the organisation. However, he has carefully nurtured conditions in which computer based procedures can have little impact. Perhaps the clearest indicator of this is the fact that although his younger catering clerk is a willing and competent computer operator, he has retained as his chief clerk the elderly lady. Now sixty six years old she is one year beyond the statutory retirement age for the hospital. Manager 13 has already obtained an extension of her employment and intends to do so for at least an additional year. "I have no intentions of creating problems for myself in that area."

The justification of the installation as an experiment strains credibility in view of its long duration. Seven years seems excessive in the circumstances. The manager offers a picture of himself as powerless and impotent in relation to hospital administration and union pressure yet this cannot be completely so. He has retained his position in the face of organisational change and has demonstrated his ability to manipulate the organisation to the limited degree necessary to install, extend and replace the computer that his department uses.

His present view of computers is that the machine is a low grade clerical device of about the importance of a calculator, a tool not often used. On occasions he has been surprised by the reactions that it has evoked from his staff. He has had to restrain the enthusiasm of his clerks and cope with the antagonism of his cooks. The control device in these circumstances seems to have been largely indifference.

His future expectations of such machines are grandiose. He expects the machine not simply to displace but to replace a member of staff.

"I see --- [the clerk] being able to plug into the system anywhere she wants and actually wait for a report to come out. . . . I see the computer as another member of staff that does what I require it at the time and I don't see it as a robot."

Such a system would have to be very sophisticated and in expressing such a view manager 13 acknowledges his lack of familiarity. However, he is perhaps also expressing his fears, animating the computer to a level at which it could substitute for a human being. The image of a growing child

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referred in the interview. At the moment, manager 13 sees the computer as a youth. When it is fully grown he seems to imagine that it will be omniscient and possibly much more knowledgeable than a catering manager.

Having a computer is important to manager 13. Using a computer is unimportant. If the computer were to be taken away, it would have no direct effect on manager 13 but he does believe it would have an effect on his department. He thinks his clerks would find some of their work made harder and he believes that his kitchen would find it difficult to produce their food orders. However, he is not a manager prone to use management information or even personal judgement in decision making. The information from the computer is being produced merely to satisfy the organisation by its sheer existence not for any role that it might play in decision making.

"I work in isolation to the computer. If --- [the clerk] were to go on holiday I would have to learn to live without ---'s information for 2 weeks. So I would deactivate the systems that we currently operate. But I couldn't do that for ever and I don't think I could do without the computer for ever because I foresee the point that it's getting more and more as a desktop model."

One day he may have to cope with a machine on his desk and he needs to know how successful a planned programme of indifference is likely to be for neutralising it.

Case Study 5 - Experimental Managerial Innovation with Computers

Case study 5 is also based on an institutional catering environment. It describes a pilot study of two different catering information systems (CIS) in 6 units of the Army Catering Corps (ACC). One of these trials involved the CIS developed by the University of Surrey discussed in cases 4 and 6, installed at a military hospital.

The role of the Army Catering Corps is to achieve and maintain a satisfactory and uniform standard of catering in all units of the Army, under all conditions, at home and abroad, in peace and in war (18). In 1983/84 it fed an average of 89,000 men per day in nearly 1,000 different
locations with an annual food budget of some £65 million. It employs approximately 9,500 catering staff, civilian and military, and managed by some 165 officers (19). It has 2 craft training centres where enlisted men develop skills, sometimes to a very high standard. Its officers receive both craft and management training. Indeed, in common with all military organisations, a great deal of attention is devoted to training. Officers may be seconded to commercial, civilian organisations to obtain practical experience or may be given study leave.

As an organisation it therefore has many points of similarity with the bureaucratic, hierarchical structure of the national health service. The catering services are equally peripheral to the purpose of the organisation of which it forms a part and its managers have the same role in respect of those to whom they send outputs as a District manager in a hospital.

The subject of this case study, manager 14 may be described as a senior middle manager. His interest in a computerised CIS was aroused during a period of formal study leave at the University of Surrey. In a sense, this case differs from cases 4 and 6 in that the innovation was introduced more pointedly as an experiment. While reading for his degree, manager 14 examined the problem environment more theoretically and planned the manner in which his innovation might be introduced in a deliberate and considered manner.

4.1 Background of Computer Usage

Despite objectives published by the Director of the Army Catering Corps as long ago as 1973, referring to the need to prepare for the use of computers in military catering, developments have been slow. Ten years later, the only computer system used by the Corps dealt with accounting and inventory control for the Catering Group at Aldershot. In an organisation as large as the ACC it would be unusual to suggest that none of the staff had any experience of computers. There were members of staff, both officers and enlisted men who had used computers in training. However, the Corps was not a notable user of technology. Small experiments with administrative data processing had not led to the installation of computerised administrative systems even in the

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headquarters unit. In 1982, computers were hardly used at all for controlling catering costs and no units were equipped with computers specifically for this task.

4.2 The Attitude of the Manager

Manager 14 is a man in his late 30s. He is a professional soldier and has made a career in the ACC which he has served for over 15 years. His initial qualification was that of a school teacher but on joining the Army and completing his officer’s course he has been given further training as a catering officer. Part of this training involved a secondment to a commercial hotel and catering company. He has occupied a number of posts equivalent to civilian catering management occupations.

His interest in computers was heightened during his secondment to the University of Surrey where he read for an honours degree in Hotel and Catering Management. He obtained a good degree and on his return to the Army was assigned to supervise an investigation into the effects of computerising some aspects of catering cost control and ration accounting.

4.2.1 Knowledge of Computers and Scanning Mechanisms

During his degree course, manager 14 received some formal training in the use and application of computers in hotel and catering situations. This included some theoretical study and some hands on experience. He owns a computer at home which he purchased mainly for his children's use. On completion of his degree, he continued to develop himself by pursuing his interest in computers much more extensively. The prospect of large hardware and software orders associated with the possible success of his study project, code named CatPac, attracted many types of commercial organisation. He thus had ready access to a wide variety of equipment, computer software and computer technologists. As his expertise continued to grow, so he was asked to write in professional journals and to speak at conferences attended by other hotel and catering managers. In terms of these six case studies, he is the most highly qualified vocationally. Besides being the best informed manager on the subject of computers, he is also the most expert technologically. He has made direct use of a number of types of computer, is capable of programming them and of designing
procedures in which computerised data processing forms a part.

In many ways he is also the most cerebral of the six managers. He is given to analysing problems intellectually and to discussing the theoretical basis for ideas which he may wish to put into effect. The scanning mechanism for the catering information system took the form of an undergraduate project, completed whilst at University. However, unlike most British undergraduates it was approached from the perspective of a mature and experienced manager. What is more, he had the resources of a large organisation to collect and marshall information. The report which resulted and which was submitted to the Army in a modified form, assumed the character of professional feasibility study. Since commercial organisations were most willing to provide data for an investigation that could result in a large sale, manager 14 was able to obtain detailed comparative data. Thus a careful cost comparison both of ready written packages and of custom written software could be made.

The scanning mechanism therefore involved a heightened, highly focused attention and an active search for information. Manager 14 makes deliberate efforts to inform himself directly about developments in business computing. He reads technical and business magazines which he actively seeks out and has continuing contact with suppliers.

4.22 Grid Elicitation

At the time of the first interview the pilot investigations for the CatPac project were complete, a report had been written and its recommendations approved. On completing the trials, manager 14 had been reassigned to work mainly on a strategic planning project at headquarters. However, he retained responsibilities for the implementation of the Corp’s computer plans in respect of catering systems.

The example decisions that he offered were mainly planning decisions and they reflect the contributory nature of a staff officer’s role. Thus six of his examples were to do with the design of systems and planning future possible courses of action. Two were concerned with selecting the hardware for the catering system.
4.23 Definition of Technology

Following the introductory explanation of the first interview, the manager’s reaction was to generate a definition of technology “as a ripoff [sic] of various things I have read.” Certainly the definition has elements in common with other definitions of information technology. However, it is of interest to note that, in common with manager 12, it stresses the communications role of technology. Indeed, the definition is almost identical to the beginning of manager 12’s. In many ways, it underlines the interpretation of the grid analysis below. Note that technology is seen as an aid to decision making, not as a decision making tool. By contrast, manager 15 defines technology more in terms of herself, something to make me a better manager.

"I see technology in the sense you mean it as the convergence of forms of communication and computation. You can merge these together to form techniques that will aid the manager in his decision making."

4.24 Grid Analysis

Figure 35 displays the grid analysis produced by the Monocle program. It is apparent that the pattern of construing is tighter, for both constructs and elements, than those of the other grids shown in this thesis. Tight construing of elements was revealed by pre-computer manager 2, though his constructs were not so firmly held. In manager 2’s case, this tight construing was probably symptomatic of a lack of differentiation and possibly of hostility and defensiveness. A similar reasoning cannot be attributed to the grid for manager 14. It is unlikely that he was either hostile or defensive. In this case, the tightness of the grid probably results from firmly held beliefs. Patterns of construing vary according to the stage that has been reached within a decision process. Loose construing allows for reorganisation of ideas but tight construing is necessary for, and symptomatic of, situations in which a person is required to make decisions. Beliefs are “frozen” while decision making takes place and then possibly unfrozen and reformed on the basis of further thinking. Manager 14 was engaged in hardware selection for the catering systems at the time of the first interview.
Constructs fall into two groups, of which the larger is perhaps the more important.

EXTRACTS DATA and DIRECTIVE (looks at one case) link to APPLIED DIRECTLY and then OVERT PRESSURE and IMPERSONAL which join at the same level.

The second group are all construed at about the same intensity. The group includes,

RESULTS/APPLICATIONS, PERSONALLY BASED and OPEN TO INFLUENCE.

Between these two sets of constructs, which themselves are only related loosely, is the notion of HARD TO USE - EASY TO USE. This construct does not fit with the main two groups very much.

The division of the elements into two clusters is most interesting. The grouping of elements within each set actually presents a very similar pattern. The first group might be described as the "tools" group or the "means" group. It consists of techniques and devices.

SSADM (COMPUTERISED) construes close to FINANCIAL PROJECTION which then join SSADM (MANUAL) and these link rather loosely to DATABASE. Finally, two devices which are construed quite similarly MICROCOMPUTER and TELEPHONE, join the set.

SSADM stands for, Standard Systems Analysis and Design Methodology. It is a technique for producing a type of systems flow chart and for identifying the logical steps that follow from that. Manager 14 used a manual version of SSADM for producing some of his plans. The computerised SSADM was an example of a technique that he would have liked to use and is linked to FINANCIAL PROJECTION which actually refers to a discounted cash flow on a spreadsheet.
FIGURE 35

Experimental Innovation - Manager 14

A Major in the Army Catering Corps

Cluster Analysis of Grid by Program Monocle

Cluster Presentation of Grid

Subject 14 - 86.86

Easy use 7
Obtains 6
Comp'ive 8
Must intp 5
Covert pr 3
Involves 9
Tool 1
Technical 4
Not infl. 2

Hard use 7
Extracts 6
Direct've 8
Apply dir 5
Overt pr 3
Impers'nl 9
Result 1
Personal 4
Open infl. 2

Database
SSADM - computerised
Financial projection
SSADM - manual
Microcomputer
Investigations
Telephone
Think tank
Discussion 1:1
Personal judgement
Pacer - discuss doc.
Synopsis

(C) P.R. Gamble 1984
The second grouping are the "ends". Noticeably they are all people based and involve discussion and thinking. The first part of this group particularly requires personal interaction.

THINK TANK and 1:1 DISCUSSIONS link to PERSONAL JUDGEMENT and is joined by INVESTIGATIONS.
The two written think pieces, construed similarly, PAPER (DISCUSSION DOCUMENT) and SYNOPSIS then join the cluster.

The second group, which is clearly the set of elements directly related to decision making, is less easy to influence, subject to covert pressure, requires interpretation, obtains information and deals with problems comprehensively. The construct TOOL was elicited in the form of a mechanism rather than a device and TECHNICALLY BASED may perhaps be interpreted as using personal technical skills. The first group, within which MICROCOMPUTERS are construed, serves the second. Cluster 1 contains elements which extract information in a narrow (directive) way, impersonally. This information then has to be applied and shaped by personal influence which allows it to be used and allows it to apply overt pressure through the form in which it is presented.

4.25 Grid Evaluation

Such subtle forms of power are sometimes used by organisation members who are not in a position to control the organisation more directly. The phenomenon was described in chapter 4 in reference to the work of Mechanic (20) and of Lee (21). Access to information, people and resources are important sources of power for subordinates in organisations. Mechanic saw these as being partly attributable to social networks in the middle of an organisation. However, Lee recognises that the way in which middle managers assemble and present data provide opportunities to bias (or influence in the words of manager 14), the result. Thus solutions may be filtered, problem recognition may be defined selectively and the decision making process may be shaped, by influencing the content and circulation of reports or seeking to alter the composition of committees. In this way particularly, middle managers can bring about incremental changes.

Two grids provide an interesting comparison to manager 14. The first of
these is that of control group manager 8. Manager 8 is also a technological catering manager, he too construes his elements in two main clusters with a third, peripheral cluster which describes text books and reference tables. Manager 8's clusters are on the one hand machines, such as telephones, calculators and microcomputers and on the other lists, forms and files. Personal aide memores and people orientated committees are loosely linked to the second set. The second interesting comparison is that of mid-computer hotel manager 4 who works with his own Apricot microcomputer. His element clusters are more difficult to interpret but fall in roughly 4 groups. These are, communications (telephones and meetings), computers, files and decision making (personal judgement, 1:1 meetings, professional advice). In all three cases, the technologists have construed people based activities away from machines and procedures.

4.26 Other General Attitudes

Manager 14 seems to have chosen an almost messianic role for introducing technological change and developing his organisation. He perceives the present decision making process to be poorly defined and lacking in formal structure. That is to say, the organisation is pushed into making decisions by dint of a crisis and then finds itself ill equipped to deal with the situation. It has no formal systems for the collection and management of information. Thus it draws heavily on personal judgement. Once a decision is made, information is collected that will support it 'objectively'.

"Decisions are now made subjectively and we go around trying to support that process. We aim to reverse that, to review a situation and then make choices. It's a bit pie in the sky because you're always going to get personal judgement."

Curiously enough, this model of technology and technique serving the process of personal judgement emerges quite clearly in the grid. There is of course no indication that decisions based on hard data are going to be more correct than those based on soft data. However, it is apparent that the application of formal procedures, involving the use of hard data, is more consistent with the ethos of a military organisation. In order to bring about change, manager 14 embarked on an overtly political process by

P.R. Gamble
attempting to manipulate the formal organisation.

"I took an individual opportunity to start the ball rolling, some covert activity to force decision making and then a lot of politicking."

He therefore worked across the organisation at middle management level, taking opportunistic advantage of other forms of organisation development that were taking place at the time. Thus the idea for changed was passed up to senior managers (high ranking officers) in another part of the organisation where it gained support. The idea was then transmitted from this high level to manager 14's superior officer, his boss. This senior manager was therefore requested to consider the idea and make a response not to a lower level of his own department but to an important member of the organisation whom it was necessary to impress favourably.

4.3 The Nature of the Innovation Decision Process

Although the Director of the ACC had identified the need for the Corps to prepare for the use of computers in 1973, actual developments in the remaining years of the decade were minimal. An inventory and accounting system had been installed at Aldershot but the Corps as a whole had shown itself reluctant to innovate or experiment with computer technology. Thus the position adopted by the Corps in respect of managing its catering functions might be described as traditionalist.

However, by the end of the decade other initiatives were taking place in all three branches of the Armed Services. Thus in 1981, the Director of Army Staff Duties sponsored studies to identify a rational approach to the use of microcomputers for administration (22). This was a task taken up by the Defence Administrative Computers Division. Thus in mid 1981 an Army study was published,

"with a view to recommending how the benefits of developments [in modern office technological systems] could be most cost effectively used in the administrative support area." (23)

At about the same time, a pilot study from an exercise known by the acronym PAMPAS, Personnel Administrative Microcomputer Pilot ADP System,
had also been published (24). Both studies had implications for the ACC which found itself caught up in a political environment where substantial technological change to which it was apparently unable to respond had become current.

4.31 The Nature of the Problem

At this time, manager 14 was reading for a degree at the University of Surrey. Whilst there he identified the circumstances as those which offered a convenient opportunity for the technological innovation.

"I identified the problems. . . . I'd found a solution and was going looking for a problem."

Specifically, the problems that were addressed were those of the working practices of the ACC units themselves, especially the clerical and accounting procedures. An awareness of difficulties in these areas had been acquired through direct personal experience. Manager 14 had worked with the existing procedures for many years. Principally, these problems made themselves felt in terms of food ordering. There was no link between what was being purchased and what was being served. Purchase decisions were being made on the basis of little or no information, ostensibly on the premise that meals could be constructed from what was available. In consequence, many emergency orders had to be placed and cooks complained constantly to the officer in charge.

"As the catering manager of that unit you tended to get rather fed up. You were responsible for the buying and you were again responsible for the menu construction. But there was a certain amount of flexibility within that for the running of the unit and the chefs themselves. But you never made the tie up between what you were buying and what you'd actually designed to go on the menu. So that I was constantly hassled by the chefs and by heads of departments who would come to you and say, 'I see you've put so and so on the menu but you haven't bought any whatevers'."

The acuteness of the problem was illustrated by a situation in which manager 14 had designed a menu by random choice, drawing lots, and it worked as well as any of the designs that had been carefully planned.
Thus the pressure for change was more from the workforce than from the customers. There was no pressure from above to correct the situation.

The problem itself had existed for years, manager 14 himself acknowledges that he must have been aware of it for at least 6 years or more. In his view it was also a problem that was quite widely recognised. Not so much in the sense that other officers discussed it formally, "if asked they would have said there is no problem". However, since many of them had voiced concerns over the procedures from time to time, manager 14 felt that on reflection they would admit to its existence. It was not perceived in any sense as a crisis since its resolution was not central to continued system functioning.

The opportunity for solving it was presented to manager 14 during his studies at the University. Here he was in an environment where he could spend time thinking about the problem and considering alternative solutions. "It was the ability to be away, outside of that environment [the Army] and that provided an opportunity to think about it". The organisation's formal innovative device, the PAMPAS management services exercise itself did not therefore trigger this particular innovation. Although it may have provided a reinforcing mechanism, it seems to have been the opportunity to consider the problem objectively that was of greater importance.

Consequent upon these circumstances, manager 14 chose to pursue his solution in political terms in order to obtain support and funding. Asked if he consciously chose to embark on a political process to further his solution, the manager replied,

"Absolutely! It was a very conscious, rational decision. I knew full well that unless I embarked on that [political] process, nothing would happen, it [the system] would die a death."

The pressure for the innovation was therefore that marshalled by the manager. The pressures against were perceived in terms of the "sheer inertia" of the organisation itself. Manager 14 saw such resistance as a natural organisational response and quoted the remark of one senior.
officer interviewed during the research process in 1982, "I wouldn't bother doing that; we looked at computers in 1973 and we didn't think they were a very good idea".

Outside the Corps the environment was more supportive. In addition to the background of the PAMPAS project, there was generalised support from the data processing department of the Ministry of Defence. This department provided technical advice and actually funded the pilot systems.

4.32 The Search Procedure

The search procedure sought was designed to lend objective rationality to the chosen solution. It took the form of a report, a series of six pilot installations and a second report on the findings of the user trials.

The first report produced in 1982 (25), examined the current procedures and identified the manner in which a computerised information and control system could assist in their management. A careful analysis of tasks was undertaken and this led to a statement of user requirements for a microcomputer based planning and control system. In addition, the main parameters of the system, the nature of the computer files and the necessary inputs and outputs were identified. Ten alternative commercial catering information systems were compared in terms of the extent to which they met user requirements. The costs and benefits associated with the development were assessed and quantified in terms of manpower and provision cost savings. The study concluded with a recommendation for user trials so as to investigate the implications more fully. In short, a formal systems analysis was carried out in some depth, objectives were specified and the basis of future evaluations made known.

The systems analysis was characterised by heightened attention and an active search for information. It was well presented and closely argued. Technical advice was sought and obtained from the data processing department of the Ministry of Defence so that specialist computing experts were a party to the report. The study concluded that substantial financial savings could be achieved. Taken together, the study and its findings presented a highly convincing document. As a result, given the environment of the management services exercises, the army agreed to a
field trial of two computerised catering systems and allocated a staff of manager 14, along with two warrant officers and a clerk. The project was labelled CatPac.

Two systems were trialled in six army catering installations in the north of England, over the period March 1984 to March 1985. Five of these sites were chosen so as to reflect representatively the different situations, in terms of the size and function of the unit being served, for which the ACC had to cater. A CIS was installed in four of these units for a period of three months. In the fifth unit, the installation was tested over a nine month period in order to study long term effects. The sixth pilot involved the Surrey University CIS described in cases 4 and 6, which was installed in a military hospital.

4.33 Staff Involvement, Consultation and Training

During the "lobbying process", many other managers had to be approached and their views canvassed in order to obtain support for the idea. The final decision itself was actually taken by a senior management committee.

Considerable consultation had also been undertaken with actual potential users. It must also be noted that for many years, manager 14 himself had actually been a user of catering management information. However, the six pilot installations themselves were not involved until after the funding decision had been made. In practice, following the approval, several months elapsed whilst negotiations were conducted for the purchase and installation of the systems. This intervening period allowed an opportunity for the commanding officers of the trial sites to be approached so as to secure co-operation.

Initially, training was given to the CatPac team at their offices. The catering systems were then used by the warrant officers on the project team to set up ingredient and recipe files. During this period, further support was available from the companies that had supplied the systems. Following two days training at the CatPac offices, each unit was then supplied with a system capable of fully functional operation. Further on site training was then undertaken by the warrant officers attached to the CatPac project. The latter rapidly became expert at using the catering
systems and were available to provide substantial user support where required. One of these warrant officers wrote a substantial ration accounting program in Microsoft BASIC. In addition management advice on the operation of the system and its implementation was provided by manager 14. A great deal of technical advice was therefore available from experts with a close knowledge of both the applied management domain and the computer system.

4.34 Implementation

On the basis of this support, systems were provided to each trial unit "in working condition". There was no attempt to introduce the system in modules and no phasing. The intention was to make the system operational from day one. This method of approach proved to be less than optimal and in retrospect is seen as a mistake. Users were not able to acquire any ownership in the system and in some instances, the preset recipes all had to be scrapped and the system rebuilt from scratch. Such rebuilding resulted in many of the beneficial side effects observed in case study 6. The data preparation proved to be a useful training exercise and users were later more inclined to use the system honestly than to try and "fudge results" in order to make it work.

Particular problems were experienced with the Surrey University CIS installed in the hospital and this system was never to work successfully in that location. This failure can be attributed to three possible factors.

The first of these concerned the hardware. There were repeated hardware faults in the computer originally supplied. Eventually, after several months and many complaints the manufacturer replaced the faulty machine. Problems were experienced too with the sense marked cards on which patient meal orders were collected. Government purchasing procedures obliged the army to purchase cards from an "approved" printer as opposed to the recommended specialist printer. The company designated for the job had no experience in this type of work. Unfortunately, the first batch of cards produced were wrongly printed and, in the second batch, one set of cards was inaccurately cut. The hospital was therefore left with a system that would not work on Thursdays. On Thursday, the patient meal cards were too
big to feed through the card reader.

The second set of problems were procedural. Some difficulties were experienced due to changes of staff at the hospital.

Thirdly, and most serious of all, there were management problems. At the time the system was being installed, the officer in charge of the hospital's catering was awaiting a transfer following his recent promotion. He had no interest in the computer system and was not prepared to make any effort to see it implemented successfully. His next career step was assured and he was marking time until it took place. His replacement showed more initial interest but lost confidence in the face of the hardware problems. This situation was exacerbated by the head chef, an experienced warrant officer, who also showed little inclination to work with the CIS.

Not that the system was entirely without its protagonists. The corporal clerk in charge of the stores made strenuous efforts to operate the system from his position. Since this involved driving the system backwards as it were, that is to say by making it reactive to what had occurred rather than allowing it to exercise control over what was to occur, the system was forced to function exactly contrary to the intentions of its designers. It is evident in any case that given opposition and indifference from both supervisory and management levels, operators rarely possess the power needed for successful innovation. Although the system began to work well towards the end of the trial period, the catering officer's concerns about its reliability were not allayed and the system was eventually withdrawn.

In another installation, in which the other catering system was to have been installed, the attitude of both the catering officer and the (civilian) clerk were extremely negative. The officer in this case was on the verge of retirement and had little interest in new systems. Their antagonism of these two men was so strong that the trial was switched to another unit after only one day.

The importance of the unit managers to the success of the trials was strongly identified by manager 14.
"Because I felt that if we'd started with the unit manager with a degree of commitment to making the project succeed, you'd have overcome a lot of the faults. As opposed to taking almost exactly the opposite view of almost open delight when the faults occurred."

In the remaining four units, manager 14 considers the systems to have had "varying degrees of success". The key to the variation being attributable to the personal motivation of the prime user. The term 'prime user' not always being synonymous with unit manager. Some of the difficulties encountered were attributable to the increased formality of the computer system which did not allow errors to be corrected by the simple expedient of a pencil and eraser. However, on the whole, these remaining systems were considered successful.

One measure of this success was the reaction of users when the system was about to be withdrawn for another trial. Users were generally reluctant to try and manage again using only the old manual systems. A further measure of success was taken when users began to make suggestions for improving system functions or for increasing the range of tasks.

4.35 Management Evaluation

Success was also measured in more quantifiable terms by the full study report prepared on completion of the trials in 1985 (26). Outcomes were compared with objectives established by the preliminary study report and were found to have been met by and large. Changes to staffing levels, improvements in organisational work practices, more accurate management information, and even improvements in food quality were all noted.

In organisational terms the result was significant. On the basis of the full study report, a functional specification for army catering information systems was developed and approval obtained for a £2.5 million investment programme to establish more than 300 systems over a four year period. To recover this cost a 4% saving would be needed on the provisions budget. In practice the reduction in food costs and inventories, is expected to achieve a 6% saving, about £4 million, before manpower costs are taken into account.
Valuable experience was gained from the trials in terms of the process for introducing these systems in the future. The army appears to have validated the model described in case 6 by which a phased introduction allows users to validate data and establish the system gradually. The most acceptable modules to the users are those to which they can relate directly. In the case of the army, these were the ration accounting module and stock control. In each case, the computer system could be directly compared to a well understood manual procedure. These are the most mechanical elements of the management procedure. When the system has established credibility, by making these tasks both easier and more accurate, further modules can then be introduced in which the manager’s individual decision process has more influence. Menu planning would be an example of such an area. This may then build acceptability for procedures which are different in nature from manual systems, such as the use of the standard recipe as a basis for control.

The political nature of the decision making process used to manoeuvre the organisation is considered central to its initial acceptance. The opportunistic and political nature of the exercise is heavily stressed by manager 14.

"If I was actually doing it now I would have to embark on more political activity then I had to then. It would be much harder to gain and seek approval for that project now. Largely because this particular system will be the second, large scale, army wide administrative system to be introduced. The fact that it’s a catering system in army political terms gives it an extremely low status. Now it is only because we came along with a ready made technical solution, and the time was absolutely fortuitous, that we were able to move forward with that particular project."

As the PAMPAS project became more established, so the bureaucratic organisation which is the army set up more formal procedures to deal with microcomputer projects. Additionally, demands for resources from other areas of higher status were being made for funds. The ACC is seen as a "soft option", a service, support industry of low status. In consequence "the available funding would actually be channelled elsewhere. We would be fobbed off." In such circumstances, manager 14 was of the opinion that
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dedicated systems of the type obtained would not be forthcoming and that the ACC would be asked to make do with small routines that dealt only with a part of the process.

4.4 Summary of Main Findings

Case study 5 is an example of a middle manager wishing to innovate with computer technology faced with two problems. The first of these is a highly formal organisation structure and the second is the traditionalist view of catering management adopted by his colleagues. The product champion became committed to the idea of his proposed solution during a period away from the organisation, when he was able to think more conceptually. Manager 14 subsequently used a political approach to subvert potential objections to his proposals. This was brought forward at a time when the large organisation of which his Corps (his department) was a part had introduced objectives which gave a high value to technological innovation of this sort. In supporting the pilot study, manager 14's superior officers were also reinforcing their own position. Thus the nature of the decision process itself was opportunist.

The trial installations themselves were an effective part of this political process. The case also provides an example of controlled experimentation with managerial innovation. It must be noted however, that the success of the pilot studies was very important to manager 14. He was closely associated with the idea of computerised administration and his career may have been adversely affected had the trials resulted in an unsatisfactory outcome. The full study report on the trials may be seen as a political document in some ways, its job is not to weigh pros and cons but to support the case. It emphasises the positive aspects of the experiment very strongly, perhaps at the expense of balance.

The point may be illustrated by a small example. A copy of the questionnaire described in chapter 6 was supplied to manager 14 who modified it for use in the army. The full study report includes a copy of the survey form and explains how it was used to measure attitudes before and after the installation of the pilot systems. No results are included in the report and, as far as is known, no comprehensive analysis was actually undertaken. However, the implication that careful monitoring of
attitudes and acceptability took place, helps to support the findings.

Judged against their objectives, the pilot studies were a success in both personal and organisational terms. Indeed, four catering systems were still running one year after the completion of the trial period. Manager 14 was seen as a capable innovator by his Corps and he obtained substantial resources for a major capital investment. At the same time, important lessons were learned about the nature of the innovation process. In particular, the value of a phased implementation of this technology and the need to build ownership in the system emerged clearly. The attempt to install a complex system more or less as a complete whole was recognised as a mistake.

"We took them down and spent a short time loading the database for them, or with them and then we said, 'Go, run!'

In practice, this did not work,

"because they needed a much more phased introduction... . . We taught them on the complete system from the word go, as we understood it. That I think in itself was probably a mistake. . . . They were trying to make the whole thing work from day one where you were still finding where you needed to make corrections to the database or you needed to do all the recipe modifications and so on. So you were rather expecting the end result before you'd actually achieved the mechanism by which that end result was going to be possible."

One of the reasons for this problem was due to differences between the manifest and the extant organisation. Although in this highly bureaucratic organisation, all units were supposed to be working from the same standard recipes, in practice many small variations occurred. Thus on one occasion, a recipe file that had taken the CatPac team over a month to assemble, had to be scrapped within two days of installation. This rebuilding was important for the users as it made them more conscious of the way they organised their work. The analogy with case study 4 is very apt. The hospital in case 4 attempted to use recipes created elsewhere. The process of trying to adjust to the minutiae of another organisation reflected badly on the system. In case study 6, the phased introduction
of their own recipes proved much more satisfactory to the work group.

Manager 14 was to come to the opinion that giving the user "very little" was much more successful than trying to impose work patterns. The preset data file represented an intrusion, a loss of flexibility and autonomy. When units realised they could have their "own" recipes many early fears were dispelled. In one instance, a recipe named after its creator, "Paddy's Bread Mix" was entered on the computer. In the full implementation, units will be encouraged to go through a planning exercise for their own data files in advance of the system's arrival.

In common with the civilian hospital installation reported in case 6, the computerised information system had some interesting side effects on the balance of management power. It gave unit catering managers the ability to produce authoritative management information in such a way "that made it almost irrefutable by other agencies". In addition, the computer also gave them a status over and above their normal status as a catering manager. Status was also a factor affecting successful implementation. In units where female clerks were employed, they reacted more positively to the system because of the improvement in status and increased responsibilities that use of a computer system implied. No incentives were necessary such as higher levels of pay.

Effects were also noted in terms of management style. In dealing with outside departments, catering managers could adopt a more authoritative position. They were able to support proposed costings or calculate the effect of changes with detailed, accurate data. Internally, the system allowed managers to be more democratic. As manager 15 was to observe, formulating recipes or developing procedures to take greater advantage of the computer could be left to the cooks.

The main premise of the hypothesis being examined here is strongly supported by this case. Through his determination to innovate, manager 14 himself was able to introduce computers in an environment not normally predisposed to technological innovation. The grid analysis indicates that manager 14 construes computers as mechanical organisers of data rather than as part of decision making. It is interesting to note that he sees their greatest acceptability in the mechanical areas of stock control and
accounting.

Similarly, in the trial units, where the manager (or the prime user) took a favourable attitude to the computer installation, it was introduced successfully, although within each trial unit there were sometimes "one or two individuals" who did not regard it favourably. A commitment from a clerical level, as occurred in the hospital installation, was not enough for a successful implementation.

The effect of the catering system in the army will be to displace some clerical labour and to change the job of some cooks. The threat potential of the system may have been greater if such effects had been made clear to the work force. However, they were not made explicit.

"We took the line that during the pilot there would be no job losses at all... When we introduced the system it was in good faith. We didn't state and we still don't state that jobs will be lost but we know other elements of the organisation, of the army as a whole, will actually seek job losses as a result of the introduction of this technology."

Where job losses are envisaged, these are likely to be effected through natural wastage.

The trial itself was not used as a means of introducing other organisational changes. The full implementation of the system will cause the nature of both operative (cooks and clerks) and management jobs to change. The catering system will then be used as the vehicle for introducing other changes. The method of processing accounts will be altered and the CIS is being used as the device for obtaining agreement to alter accounting procedures. It is also intended change fundamentally the way in which the supervision of army catering services takes place. In effect, additional information will make possible an extension of the responsibilities of unit catering managers. Thus the development of the organisation will take place holistically in a manner reminiscent of the approach used by successful innovator, manager 12.
On balance therefore, technological innovation has been introduced by a series of opportunist, political decisions. In situations where it has attracted a local product champion it has been implemented successfully. The technology itself is perceived to have greatly altered the information environment of the catering managers who have used it and has been justified in terms of the quality of decision making and improved control. Some of these differences are probably qualitative, data from a computer seems to carry more status in this organisation than some other data. The differences are none the less real for all that. As a result, catering systems will be introduced more widely into the organisation and this in turn will be used as a political device for further change. At first, these changes will take the form of increased local control. In the long run it is evident that more centralisation could occur when unit computers are linked.

5 Case Study 6 - Successful Innovation with Computers

In 1980 when the catering information system (CIS) was first installed, the National Health Service was organised into 14 Regions and 90 Areas. Each Area in turn comprised Districts and each District had a number of units. Case study 6 is based on the installation of the CIS in a health District. The District catering manager had under her charge 5 hospitals offering a total of 1,824 beds requiring the service of approximately 5,000 meals per day. The annual provisions expenditure for the District in 1980/81 was about £1.8 million of which just over £1 million was associated with staff feeding. Catering consumed 6% of the total budget for service provision in the District.

The system was to be installed in largest hospital in the group accounting for 1,600 of the 1,824 beds, almost 88%. 1,200 of these beds were given over to psychiatric patients and the remainder belonged to an acute wing. Most of the 175 catering staff were based in this unit which is where manager 15 had her office. Indeed, some meals were prepared in this main hospital for some of the small units and most of the catering administration was carried out from this point.

Following the meetings with the Area treasurer described at the beginning of this chapter, it was manager 15 who responded to contact from the
University of Surrey and whose drive encouraged the other two District managers in the Area to associate themselves with the pilot installations. The opportunity to undertake such a system was presented by pressure being passed from government, down the line through Regions and Areas for "better" control of provisions expenditures. This pressure was represented by the establishment of a Resources Allocation Working Party (RAWP) established by the Public Expenditure Service Committee of government in order to distribute funds equitably between Regions and Areas. Since its inception the RAWP had set up a number of ratios by which funds were allocated to different places. Despite their complexity, these ratios had led to the closure of several London hospitals for lack of funds, principally because the ratios were related to population and did not account adequately for mortality rates and health demands.

Given the shortcomings of the Area's financial system described earlier, it was evident that better control could not be supported from this source. With this knowledge, an argument was put to the Area treasurer on four grounds. First, it took the catering manager's staff 2 weeks to recost the 700 staff menus in use. Thus the job was only undertaken every 3 months with the result that cost recovery from staff was not achieved. Second, since meal prices were only reviewed every 3 months, it was difficult for the catering department to stay within budget parameters even for patient feeding. Even so, about 15% of the dishes being recosted changed so little that the effort spent on recomputing their production cost was effectively wasted. Third, studies of plate waste had shown that approximately one third of all food produced was being thrown away. This was partly attributed to problems with quality control, failure to observe recipes, over large portion sizes and adherence to standard national health service recipes that did not constitute reasonable dishes. Fourth, these latter problems were reflected in adverse comments about food standards in patient satisfaction surveys.

However, it cannot be suggested that these arguments, even taken together constituted a crisis. They certainly did not of themselves point towards a computer based solution. The hospitals being closed at such a high rate by the RAWP were mainly smaller, community hospitals. They were not the large hospitals offering the main provision of medical care to communities of 210,000 people. It is probable that continued development of manual
procedures already introduced by the District catering manager would have sufficed as a response to political pressure. The moral imperative to continue feeding patients (and staff) was overwhelming and if budgets were overrun then any shortfalls would have been met. The failure of the planning and control systems did not truly represent a crisis in the same way as the failure of a hotel front office system. The problem type therefore represented is that of an opportunity, rather than a crisis. An approach from the University coinciding with a heightened attention to the problem of controlling and recovering costs.

In this process, manager 15 could be seen as the opportunist or driving force. When this was put to her she replied,

"Yes, I think so. I think there had to be a driving force, because people are happy, people don't like change. So, change has to be controlled and managed. Effectively, all we were doing was changing people's work and systems and that needed to be controlled. And I suppose again it was seeing the computer system as a tool to allow tighter control."

5.1 Background of Computer Usage

At the time of the CIS development, there were no computer systems available to the District catering manager. Her only contact with them was in fact through the financial printouts provided from the Area treasurer's office and the supplies department. While the hospital was an institution replete with technology, its use for administrative purposes was fairly minimal at unit level. The catering department itself used very little office technology and was still making use of some manual typewriters at the time. Beyond the telephone, there was little evidence of any technology in the catering manager's office.

A second major reorganisation of the national health service within the ten year period since 1974 had created considerable uncertainty in the way in which hospitals were to provide catering services. One effect of the 1981/82 changes has been to eliminate a career path for catering managers. Recognising this, manager 15 had transferred into personnel and at the time of the interview occupied a senior position equivalent to that of a
Six years later the layout of her work environment was very similar to that of her former office. For a personnel manager the layout was very formal. The desk was interposed at an angle across the room between the manager and any visitor. The desk now contained a digital telephone link of greater sophistication than that of former years but there were no direct links to a computer system, no microcomputer and even no sign of a desk calculator were to be seen.

5.2 The Attitude of the General Manager

When she was a District catering manager, subject 15 was in her mid to late twenties. She had worked for the national health service in catering since leaving college with a technical diploma in hotel and catering management. In 1980 she was enrolled part time at a technical college to study for a Diploma in Management Studies where she had an opportunity to consider the role of computers more carefully, though there were no specific opportunities to use the machines during the course. Such an opportunity for thinking may have had an important bearing on the project in common with that of manager 14.

Many studies of managerial work, stretching over a considerable period of time, present a picture of management behaviour as reactive, tactical and frenetic. Thus Carlson (27) in 1951, Horne and Lupton (28) in 1965 and Mintzberg (29) in 1973 all indicate in studies of time budgeting that even senior managers spend little time on planning and abstract formulation. They tend to hold many short face to face meetings which flit from topic to topic, are subject to constant interruptions and tend to respond rapidly to the initiatives of others. Indeed, they seem to become so accustomed to this pattern of work that where interruptions are not generated from outside, the manager may generate his or her own by switching tasks or making telephone calls. Judging the effectiveness of this behaviour is more difficult. Brewer and Tomlinson (30) have suggested that this work pattern allows managers to deal with complexity by rapid accumulation and synthesis of data. Kotter (31) developed this by arguing that the absence of planning was more apparent than real and that such apparently opportunistic behaviour was a way of achieving a
great deal in a short time.

However, it is evident that such behaviour provides little observable opportunity to solve problems by means of thinking about a theoretical framework. At least, it is difficult to detect signs of what is classically regarded as the traditional activities of management as Mintzberg points out.

"If you ask a manager what he does, he will most likely tell you that he plans, organizes, co-ordinates and controls. Then watch what he does. Don’t be surprised if you can’t relate what you see to those four words." (32)

Thus the occasion to study a problem formally and at length may have had an influence in shaping the choice of solution. Both managers 14 and 15 were able to reflect more deeply about the problem environment due to their academic involvement. They may therefore have recognised the theoretical implications of the problem environment more completely than was possible for the hotel managers. Nevertheless, the selection of a computer based solution by manager 15 was related to a very instrumental approach to achieving a particular result.

"It’s seeing the computer system as a tool to allow tighter control. . . . It’s a tool to do a particular job, to try to do the best job that was possible."

5.21 Knowledge of Computers and Scanning Mechanisms

The catering manager herself had very little background knowledge of computers. Her formal education had included no computer courses. However, in a previous job with another health authority Region she had been involved as an assistant in the menu costing project undertaken by the Institute for Operational Research. Her contact with computers was therefore through a complex project which had not been a success.

Her scanning mechanisms for keeping up to date consist mainly of reading journals and magazines. These are professional journals which are read broadly rather than with any specific searching for information about relevant technological advances.
"Probably the reason for that is because of the overview development of technology for personnel within the Region and the limited ability to influence the direction it is going to go in".

The characteristic instrumental approach which she had employed as a catering manager seems to have been continued in her new role. During her first personnel job as a District manager, she had introduced another microcomputer system for manpower planning, this time working with Manchester University.

"The Regional development was too slow and I wanted some manpower information and I wasn't prepared to wait two years while things developed. That was two and a half years ago and the [Regional] system is now developing so it's worth latching into . . . we have to take it on board anyway."

Her current scanning mechanisms also include organising "one or two" in house courses on database management for personnel systems held at Manchester University.

This behaviour seems consistent with that exhibited six years earlier when the CIS was introduced. The manager seems predisposed to a proactive, problem solving approach different in character to that used by the hotel managers. It is almost scientific in approach.

"I'm just trying to influence the Region, as well as developing their own system, taking one District and doing something different so that you've got a comparison."

Thus it would appear that her scanning mechanisms switch from passive to active as problem awareness is heightened. This heightened awareness is then associated with an active search for information. The experts to which she turns are not necessarily restricted to those within the organisation (be that writ little as the hospital or writ large as the health service). Where internal resources are considered insufficient she organises a mechanism for collecting additional information. It is of interest to note in passing that the device of an outside agent also has a useful political effect for attaining a desired outcome.

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This programme of managing for change was reflected in the first example decision, quickly elicited, which related to the recommended appointment of a full time manpower planning officer to implement the proposed manpower planning system. Again, this relates closely to the procedure associated with the CIS for which the manager appointed a clerical officer to operate the computer. Thus the technological innovation is supported by developing the organisation. The first example was then followed by a reaction observed in other interviews, such as that of manager 12.

"I've stopped making decisions. I don't make any.
... No, that's not true at all, I'm being silly because I make them all the time."

Her current role is that of a staff manager whose position is one of influence rather than direct line authority. Thus the decisions that were elicited were orientated towards this technique of influencing and shaping. These included recommendations about organisation structures, levels of payroll and the production of reports. However, a statement such as,

"The role is really influencing rather than decision making."

may be a recognition of the political process by which decisions are shaped. This idea emerged even more clearly when discussing the tools and techniques which she used for making decisions. A sense of management as a political process emerges strongly from this view of the importance of personal judgement. It will be noted that these sentiments also convey an awareness of a need to consider the implications for and potential reactions of other coalitions of managers within the organisation.

"I think it's feel for the organisation. If you like, political sensitivity to the local climate (with a little 'p' because we've got the big 'P' floating around as well). To identify the needs of the authority and where they wish to place emphasis. Also what will work. How things will knit together and work. And I suppose part of that is chatting with people within the structure to see
Thus it will be noticed that the elements elicited in the grid in figure 36 seem to divide between formal and informal mechanisms, the latter being important political devices. This division seemed to create some difficulty for the manager when she attempted to rate the elements on her own constructs. For example, the construct LEADING - PARTICIPATING was hard for her to use since it depended on the role which she perceived for herself at the time. The constructs seem to be highly situational and relate to the outcome that is being sought. Her approach is almost Machiavellian in character, making extensive use of role playing to suit a purpose. She seems to adopt a role according to the contingencies of the problem and this is strongly related to some sort of meta-construct to do with controlling and arranging.

Although 10 constructs were actually elicited this problem recurred, according to whether she was seeking to lead from the top or influence from below. Eventually, only 7 of her constructs were used and a different construct LIKE - DISLIKE was offered.

5.23 Definition of Technology

"The tool to assist one do one's job in a more effective and efficient manner. I suppose the thing that springs immediately to mind is computerisation of whatever is 'computerable' - if that is a word, because it's just a tool to assist."

Whilst it may be that the form of this definition was influenced by the context of the interview, it is evident that manager 15 is inclined to make use of computers if they serve a purpose. Thus as a catering manager she had seen their potential for "doing the best job possible" and as a personnel manager she had identified another similar role for them in respect of organising the data necessary for manpower planning.

5.24 Grid Analysis

The grid analysis by the Monocle program is shown as figure 36.
FIGURE 36

Successful Innovation - Manager 15

A District Catering Manager in the National Health Service

Cluster Analysis of Grid by Program Monocle

Cluster Presentation of Grid Subject 15 - Q5.86

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Constructs are not closely linked but there is one grouping that seems to relate to this central idea of influencing and controlling,

makes ARRANGEMENTS is linked to DO NOT CONTROL output this is associated with LEADING, DISLIKE and RIGIDITY.

It is interesting to note that the offered construct LIKE - DISLIKE was construed quite centrally. Constructs LIKE - DISLIKE, HELPFUL - UNHELPFUL and USE OFTEN - NOT USED, offered to manager 9 in the control group were construed away from elicited constructs. Manager 15's ideas probably make more sense in terms of their opposite poles. In this case, PROVIDES information, CONTROL OUTPUT, PARTICIPATING and LIKING are linked to the idea of FLEXIBILITY. This picture of a fluid, shaping process is only loosely related to the other constructs. Thus

DISCRETE and STATIC are only vaguely associated with this theme and the idea of a MECHANISM which does not describe an outcome, is not strongly linked to the main group. Again, taken at the opposite pole, the preference for, gives a TOTAL or summary, DYNAMIC and INNATE (in the sense learned) seem to be more important.

Given this rather open pattern of construing, the analysis of the elements bears a most interesting comparison with that of manager 14 by virtue of its division into two groups. The first of these is,

FORMAL COMMITTEE MEETING and FORMAL 1:1 DISCUSSION linked to TELEPHONE (a verbal device) which are loosely connected to COMPUTER REPORTS and PERSONAL FILES (documentary references).

The formal committees she found difficult to construe because of the importance of situation or role. However, as a group this set largely falls towards the disliked poles of static, discrete, no control and rigidity. The second group seems to be preferred. Thus,

MICROCOMPUTER links sensibly to VDU REPORTS ON-LINE and these then join INFORMAL 1:1 DISCUSSIONS also connected to PERSONAL JUDGEMENT and CALCULATOR at the same level.
That personal judgement is related at the same level as the calculator is unsurprising as this is the device that she uses for "fiddling about" with numbers when making judgements about pay scales or manning levels. It is significant that this second group which is liked, provides information, allows control of output, is flexible, participative and dynamic, brings together tools and people based activities. This is very similar to the pattern observed with successful manager 12. By contrast, manager 14 seemed to separate machines and procedures from personal interaction with people.

Perhaps another interesting comparison may be made with manager 7 in the control group. It will be recalled that manager 7 is also a personnel manager. The construct patterns for this manager fell into two groups unlike that of manager 15. The first of these was to do with the laborious production of relatively uninformative reports by internal staff. The second was to do with the notion of essential, informative, secret, 1:1 meetings. For manager 7 the main thrust of the constructs is not that of influencing groups or individuals by a dynamic political process but that of either assembling reports or dealing confidentially with individuals.

Differences are also observable between the element clusters. The two distinct groups of manager 15 are not visible in manager 7's grid. For manager 7, meetings involving people are only loosely related to other elements and the computer is construed in relation to a statistical report rather than a decision making process. The verbal device of a telephone is construed in relation to the non-verbal device, telex perhaps deriving from their similarity as telecommunication machines. The grid for manager 7 therefore shows a quite different person and certainly not that of someone who uses technology for decision making. The contrast between the two grids is quite marked.

5.25 Grid Evaluation

It is evident that the grid as a technique is providing useful insights into the way in which technology is likely to relate to management behaviour. Thus the grid of manager 15 reveals differences between her construction of technology and that of the personnel manager in the...
control group, manager 7. These differences may be explained in many ways. They may be affected by sex, age, personality and by differences in organisation type, commercial or non-commercial. What is important is that the construction applied to decision tools provides meaningful inferences about their likely level of integration into the decision making process.

Like manager 12, who also seems to innovate successfully with computer technology, manager 15 construes computing devices in relation to people based activities which are important to decision making. This presents an interesting contrast with another catering manager, subject 14. The latter is a technological manager to a greater extent than any other person interviewed. He both understands and uses computer technology to a much greater extent. He is capable of technically evaluating and even of programming the machines and uses them directly in his own work. However, he does not construe machine based or formal data processing procedures as integrated with those that are the direct result of individual, personal, problem solving.

5.26 Other General Attitudes

Manager 15 is not someone who seeks to use technology for its own sake. She has no intention of learning how to use RAMIS, the database system to be used for keeping the manpower records of the health authority. Neither does she utilise "the simplest technology used most frequently" in her office, word processors. These are the province of secretaries and clerks. However, she does not distinguish between computers used as information providers and computers used as a means to an end and this is important to her application of the technology.

Thus a computer is a device that,

"...will enable me to make more decisions, more informed decisions and therefore to be better. Because you'll still make a decision about things, or hopefully make some decision but it wouldn't be so informed. Or though, you may not have to make it but you bear the consequences of that."

Her attitude to working with groups of people is not very different to her
attitude to computers. Both are seen as sources of information. Thus with groups her most common technique is,

"... mostly discussion and getting information out of other people which they have, and have not used in their deliberations so far ... there's quite a lot of group discussion. In fact there's an awful lot of group discussion.

I suppose one would more easily identify formal ones because they're task orientated groups."

In many ways this is also a similar sentiment to that of manager 12. The concern is to do with extracting and using (the right) information either from people or machines. It is not important either way where the original source of that information might be. Like manager 12, manager 15 is also concerned to shape and guide decisions. Lacking the authority to do this she uses the power of her personality and chooses a role entirely in respect of what she wants to achieve given the situation. It would appear that this open pattern of construing may be due to constant reorganisation. She cannot therefore consider a technique or a tool in the abstract, without relation to a problem.

"I don't think about them. One sits comfortably in the role at the time. For example, I sat comfortably in the role of participating at the meeting today and I shall sit equally comfortably tomorrow, leading it. My role says that's the way it should be but leading and influencing are different things."

There is no sense of threat or reduced quality of life in her view of computers. The less mature search for faster decisions evinced by the pre and mid computer managers is not observed in these case studies. The technology has a function, an instrumental function either to perform a task or to provide information that shapes a decision. Computers are not seen as possessing a reasoning capability, which she sees as beyond the state of the art at the moment. Once again, it seems possible to suggest that if reasonable expectations are formed, they are more likely to be met. If the technology delivers what it is expected to deliver then the manager's attitudes will be reinforced. If the expectations are positive then confidence will build.
"I think you can use it as a tool but what it can't do is it can't do the appraisal for you. Today it can't, it might be able to in ten years' time but the information systems aren't developed enough, I don't think, to be able to look at the variations."

5.3 The Nature of the Innovation Decision Process

In 1979, political pressure for a more cost conscious approach to the provision of health care was exerted by government. As a response, treasurers in the national health service began to investigate new ways of managing revenues and costs. As part of this process, catering managers were asked to make attempts to conform more closely to budgetary norms for patient feeding and to try to achieve a predetermined surplus over the costs of staff feeding. In practice, the form of the guidelines for recovery of revenues from staff feeding rendered the government's target surplus unattainable. However, a situation in which a health authority actually subsidised staff feeding (that is, made a loss) was overtly unacceptable.

To supplement the summary data produced in arrears by the treasurer's department, manager 15 had introduced a series of manual procedures designed to deliver weekly reports to her office. However, she was conscious that these remained time consuming and error prone. They were also historically orientated and gave no measurement of potential (as opposed to planned) levels of cost with which to compare actual expenditures meaningfully. The District was making a 5% loss on the cost of staff feeding.

5.31 The Nature of the Problem

Despite the outside political environment, manager 15 was well considered by the senior managers of her health authority. The deficiencies in the authority's management information systems were widely accepted. Problems of organisation structure introduced into the national health service in 1974 were also recognised as hampering best management practice. Thus the manual procedures introduced by the District catering manager since her appointment had made a favourable impression. Whilst they had not "solved" the problems of controlling budgets, they had provided valuable

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supplementary information to that from the treasurer's office. Taken together, the problem environment faced by the catering manager could not be described as a crisis. The department was fulfilling its function of providing food and clearly its manager was making efforts to comply with the requirements of the organisation.

Thus, to take the expression used by the manager herself, neither politics with a small 'p', organisational politics, nor politics with a large P, government politics were exerting a direct external influence to install a computer. A response seen as satisfactory by the internal organisation had been made. The pressure for further change came from within, from the catering manager herself.

"I think the pressure was from me. I don’t think there were [outside pressures] - though there was pressure to improve revenue and one thing the [computer] system would do for us would be dynamically update selling prices and control stock levels to meet projected output."

5.32 The Search Procedure

Towards the end of 1979, the Area treasurer undertook some comparative work on catering costs within the four health Districts in the Area. His objective was to pressurise the catering managers to a situation where each District was achieving a 50% mark up on staff meals. The treasurer's information was based on reports from District finance officers. In each case this was inadequate and each had used different methods for separating provision costs for staff and patients.

The information from the treasurer's report was 'leaked' to the District catering managers who then met with the District finance officers and the Area treasurer. The current difficulties were accepted by both the caterers and the accountants and the catering managers agreed to move to a standardisation of reporting methods. At the same time the finance officers accepted both the data processing problems of recipe repricing and the impossibility of achieving government guidelines for cost recovery. In summary, these latter hinged on the problem of regulating the sales mix to different categories of staff; plus a requirement to supply certain items and certain areas of the hospital with food either at
cost or at mark ups below the target level.

The approach from the University of Surrey coincided with these negotiations and was recognised by manager 15 as an opportunity to introduce change. As a result of the credibility which she had established with her manual system, she was able to persuade her District finance officer to support a further investigation of a computer based solution.

It is not possible to say how openly the problem was considered at this point. A formal systems analysis and system specification were not produced by the catering managers. Discussions took place with the Regional computer centre and a visit was made to South Glamorgan to examine their system. This minicomputer system was used to produce updated recipe prices for preset production runs such as 25, 50 and 100 recipes on a batch basis. The minicomputer system at Cambridge was studied as was another batch recipe costing system devised by the Department of Health and Social Security (DHSS) with the help of the DHSS's computer centre. Consideration was also given to the South West Thames Regional Health Authority's previous attempt to establish menu costing in 1971.

These investigations strongly supported a microcomputer based solution both in terms of cost and in terms of flexibility. One view of this search process could be that form was more important than content. The contact with the Regional centre had established that in-house resources were unable to meet the need. The contact with other costing systems showed that other health authorities had considered the idea and provided a veneer of comparative evaluation. It also encouraged two of the other three District managers to consider the idea favourably. The manager in South Glamorgan spoke very positively of the benefits of the system that he had developed with the part time help of a graduate student from the local University.

Manager 15 therefore persuaded the Area health authority to provide £17,000 for the development and installation of dedicated microcomputer catering information systems in each of the three Districts. Thus in 1979 design work began in collaboration with the University of Surrey.
Having obtained approval to proceed manager 15 then began an extensive period of staff consultation. Discussions with each of the unit catering managers, begun before the decision to opt for a computer solution was finalised, were taken up again. During negotiations with the University and with the finance department, these managers were copied on all meeting minutes, correspondence and draft report formats specified for the system. Each manager was given an opportunity to comment at any stage of the process and to suggest possible modifications.

Prior to installation, all of the operational staff were introduced to the problem in the form of an explanation of the size of the catering provisions budget and the need to control expenditure. Problems with the existing procedures were discussed and the intentions for the new computer system were outlined. Union representatives, as members of staff were present at the meetings but did not raise special or unusual objections.

The discussions covered four groups of staff; office clerical staff, kitchen supervisors, stores staff and restaurant supervisors. In each case the implications of the system were explained. This was an important step because the computer system would change the nature of the work carried out by each of these four groups. The clerical tasks in the office would become computer based and the major task of creating the ingredient and recipe data files had to be undertaken. Kitchen supervisors would have to review all recipes and accept a much closer degree of operational control. Stores staff would have to accept a different form of issuing and, like the kitchen, more frequent and tighter controls on stock levels. Restaurant supervisors would be asked to pay much closer attention to portion control and improve the accuracy of their sales records.

The intention of these briefings was to build involvement and to establish a clear understanding of new target performance norms. It was important to build a commitment to an achievement associated with successful introduction of the system itself, since within the bureaucratic framework
of the organisation more material rewards were hard to bestow. Pay rises, staff regrading, accelerated promotion or bonuses could not be used as incentives. The intention was therefore to promote the target of implementing the system itself in terms of a surmountable challenge.

5.34 Implementation

The system was installed in three phases. Phase 1 required the establishment of the two main data files of recipes and ingredients. Until these were accurately recorded in the computer no other part of the system could function properly. The time required to prepare and test all the recipes took approximately nine months, since by implication many aspects of the catering department's work had to be reviewed. Issuing procedures, pack sizes, recipe formulations and even recipe descriptors all had to be agreed. One peculiarly difficult element of this was the translation of unit sizes such as tins or packs into measures by weight or volume. Phase 2 then introduced the stock control procedures. This phase was rather simpler since it involved only an agreed date for a physical stock take and transfer of opening stock figures onto the computer. Phase 3, full management reporting, then followed as soon as confidence in the stock control procedure was established.

"There was a gradual evolutionary thing because we were able to start talking about it before it arrived and [able] to move towards it; gradually change from manual systems for when the computer came."

From the beginning there was close involvement of staff. The threat potential of imposing recipes on kitchen staff was defused by the simple expedient of having them prepare their own material.

"The way I did it was, I threw . . . I said I wanted recipes for the menus. I didn't stipulate what they should be. I asked them to prepare them."

In itself this exercise was novel. Recipes in the national health service are based on a set of standard formulations printed in a book published by the department of health. These recipes show production requirements for quantities of 25, 50 75 and 100 meals and a kitchen is supposed to make
orders on the basis of these calculations. The recipes themselves are based on those of the Army Catering Corps and date back for many years. Many of them are only crudely approximate and do not formulate into dishes of palatable acceptability. Kitchen staff had been asked to prepare their own standard recipes some two years earlier but these had never been used. Putting their own recipes into production offered a creative opportunity not normally available and allowed the immediate possibility of quality improvements.

The District manager's secretary, who had no previous background of computer usage and who was then responsible for most of the data input, was given off the job training at the University of Surrey prior to installation. The system was introduced to all unit managers, clerical staff and supervisors at a meeting and its nature and extent was explained. The District manager's secretary then began to enter ingredients and recipes initially with support from the University. She then began to train other office staff on the operation of the system. As a result a group of 4 office staff became competent at working with the computer. Both restaurant and kitchen supervisors were given an opportunity to enter recipes and produce stores requisitions so as to further reduce any alienation or suspicion of the machine.

Where problems were encountered in collecting or assembling data, these were often turned back to the staff for a solution. Thus kitchen supervisors were to suggest training in the use of the system for all kitchen staff, restaurant supervisors were to devise a new procedure for recording sales records and the office staff were themselves to suggest ways of overcoming many procedural difficulties. For example, the number of ingredients and recipes in actual use was much more extensive than had been foreseen. "The democratic process of blind sampling" was used to make selections. The possibilities for rationalisation afforded not by the computer but by the structural effect of its introduction were often recognised first by the clerical staff.

5.35 Management Evaluation

On the whole, the system was accepted well by the clerical staff. Indeed, they even took to referring to the computer as 'Benson', which was the
name of a butler in a television programme popular at the time. One restaurant supervisor even took to entering recipes in her own time. There was therefore no resistance to the technology from this quarter.

"It wasn’t too much of a problem. They saw the manual things they were having to do, going. Tedious manual things being done by the computer. So it was an exchange sort of thing. We’ve got this load of work to do [data preparation] but at the end of the time we’ll lose this."

Unit managers were less easy to convince.

"I think AB was quite for it. The other guy, CD, was of the old school and while he would go along with it and whatever, he wasn’t convinced."

By 1982, when the system had been fully operational for 9 months a financial evaluation showed that compared to April 1980 when no mark ups were being achieved on staff dining resources, a cost recovery of 12.5% was being obtained, equivalent to £51,000 per annum. Patient budgeting had also improved so that in total almost £200,000 could be offset from the total provisions budget by budgeting for the new year at previous year levels. Given that the actual expenditure on hardware was only £6,000 (since the actual software was "free", not charged by the University), the return on investment was substantial. Even in quality terms, improvements were noted. Actual adherence to standard recipes and improved consistency led to positive feedback from both patients and staff concerning food quality.

This is not to suggest that the these benefits were solely and directly attributable to the computer or to imply that difficulties in implementation were not encountered. Many improvements stemmed from the rigorous examination of procedures that surrounded the implementation itself. The opportunity for critical self evaluation required for the logical implementation of a machine based procedure often leads benefits of its own. Manager 15 commented on this in a manner reminiscent of manager 12’s observations as to the effect of replacing flair with thinking.

"The discipline of preparing for it [the computer]
was a very useful exercise. It generated a far greater awareness and understanding of the need to control. The discipline of actually having to rationalise stocks, to define recipes and to have some greater logical thinking instead of artistic thinking if you like, was of tremendous benefit."

Problems were actually encountered in many areas. Thus the initial standard recipes put forward by the kitchen staff had not been properly checked when first prepared. The manual system would have allowed for ad hoc corrections to recipe formulations in a way that the computer itself prevented.

"There was a system to check recipes but it was found that they hadn’t got it right and they [the recipes] had to be changed. This caused a loss of faith. But that was basically down to them [the kitchen staff] since they’d written them in the first place."

Thus the computer was blamed for errors in data preparation. It was also blamed subsequently when the purchasing department, a department outside the control of the catering manager, was unable to meet requirements for stocks. Previously, where shortfalls had occurred, these were met by simple omission or by ingredient or recipe substitution. The machine based procedure made such alterations both more difficult and more noticeable. Despite the financial gains demonstrated by her own calculations at the time, and by her assessment of results (33), in retrospect manager 15 is not convinced that the implementation achieved what it set out to achieve.

"Its perceived purpose was to put controls in and the most easily perceived controls, the financial controls it didn’t provide. It was extremely useful in terms of its recipe costing program. That was an extremely useful tool and was used regularly but the stock control tool and costing were not adequate. . . .

There were some structural problems which we overcame and there was tremendous commitment from people to try and overcome them."

Given the organisation structure within which the catering department had to function perhaps the notion that a fully functional financial control
system could be foisted on the District from a catering department's sub-system was optimistic in the extreme. The catering department only had access to partial data, it had no control over departments from which it obtained inputs and no control over those to which it sent outputs. On balance, manager 15 observed that,

"It went well. People are committed until they keep hitting problems and it's overcoming those problems I think you still have the commitment but it still needs to be very strongly driven."

Indeed, of the three pilot systems this installation was perceived by the system developers such as Gamble, to have been most satisfactory. When this view was put to manager 15 with a request for a possible explanation she replied;

"It's difficult to say. I think you needed to commit a lot of time and you needed to take people with you and develop people and involve them in decisions, and I think that's why it was successful."

5.4 Summary of Main Findings

In common with case study 5, it is evident that where technological innovation is introduced by a middle manager, the innovation decision itself is both more considered and more political. Perhaps this follows naturally from the requirement of a more junior manager to obtain authorisation of other senior managers with no technical appreciation of their problem area. It may also follow from the more contrived manner in which a bureaucratic organisation has to be manipulated. The problem type itself is more opportunist.

Given that the middle manager has to marshall political support from the organisational hierarchy, it is apparent that this fosters direct commitment from product champion and that in this case the commitment was transmitted to others. Within the catering departments of the hospital District, there was therefore a direct involvement from a manager who had complete discretion within her operational area.

Manager 15 does not associate its operational success with the fact that
she was probably the only manager of the three pilot installations able to operate the machine herself. While this was seen to give her a greater ability to discuss system functioning with staff, she did not see how that could matter. She has no intention of operating personnel database systems directly but still expects to make full use of them. However, such a perspective may be a function of management role. A senior staff manager has a different function to a line, middle manager.

In retrospect, manager 15 feels that working with a new system as it was being developed was unhelpful.

"I think the one thing I have learned is, I don't know that I'd be a guinea pig again because you've got to be able to carry people with you and you've got to be able to work in the organisation with the system. And I think the debugging problems, somebody else needs to have gone through them."

However, the view that a direct involvement in system development may be advantageous is also tenable. Mumford (34) argues that such close involvement in the implementation of a system is highly beneficial. Designing systems for others is a speculative venture at best. To do so without taking account of their views and their preferred way of working is probably foolhardy. In a way, manager 15 proved this for herself. From her experience of the catering system, she chose to have the data preparation for her subsequent personnel system undertaken by others. This was a decision that she came to regret.

Case study 6 presents a picture of a manager determined to match a solution to a problem. Implementation of the solution was carefully executed so as to carry support from both superiors and subordinates. Commitment was bought by delivering a valued outcome to each coalition of workers. The finance department was given cost information, the catering clerks were given fewer boring, routine tasks, the cooks and restaurant supervisors were given more satisfying work. Each group was led to understand what they would get before the system was introduced and the implementation was carefully introduced. Where difficulties were encountered, adjustments to procedure or concessions were made if possible. Whilst system functioning did not fully satisfy the ambitions of the manager, the innovation was in fact successful. Had she remained
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in that job, the catering manager acknowledges that she would have continued to develop the computer based procedures.

Summary of Case Study Findings

Shamir (35) notes a certain similarity between the organisational characteristics exhibited by hotels and those exhibited by hospitals. Their organisation structures are both highly mechanistic in character. This analogy could be extended to the army since it too, is highly mechanistic. Several explanations may be advanced for this organisational form. The first of these draws on Thompson.

"The more its technology and environment tend to tear it apart, the more an organisation must regard its integrity. We would expect therefore, that organisations facing many contingencies would exhibit quite rigorous control over those variables they do control." (36)

Neither a hotel, a hospital or an army can control the interaction of their staff with customers, patients or opponents. They can however, ritualise the behaviour of their staff by putting them in uniforms, differentiating their functions and by limiting their contact with non-members of the organisation.

A further more speculative comparison may be drawn, particularly between hotels and hospitals in terms of the needs of members in both types of organisation to defend themselves against their own and customer’s anxieties. Menzies (37) identified the importance of social mechanisms as a defence mechanism against anxiety and has furthered her arguments through the illustration of hospital work. The point may be extended to hotels. Both hospital and hotel staff perform intimate, personal tasks for their customers. They prepare and serve meals, they clean bedrooms and make beds, they come into contact with personal habits and personal articles. Ritualisation and differentiation of tasks supports role playing and prevents members of staff from performing more than a few tasks for any one customer. At the same time, this formalisation protects customers from too close and intimate a relationship.

However, there are important differences between the organisations
described in cases 4, 5 and 6 which distinguish them from those in cases 1, 2 and 3. Not least of these is evident in terms of sheer size. The national health service and the army are extremely large organisations and sub-units within them are influenced by a standardised administrative structure to a degree unmatched by a commercial hotel company. The primary purpose of each of these organisations is far removed from the provision of hospitality. Each of them does provide hotel services by way of accommodation and food but this is seen as peripheral to their main function. If the role of catering services is seen as unimportant or peripheral by senior managers this affects the status of the service and the managers within it. There is no route for a catering manager to the top of either of these organisations. It gives them low priority for resources.

There are other important differences between the nature of the catering services provided by hotels and institutions such as hospitals and the Army Catering Corps. Not least of these is of course the non-commercial character of the latter two. Taken with the fact that the customer in a hospital or in the army may be less capricious in the exercise of choice, this provides the caterer with a less volatile market. In some situations customers in the form of patients or soldiers may have no opportunity to exercise choice and this may affect attitudes to the way in which services are marketed. Pressures from administrators to minimise the cost of catering services in these circumstances may be met by reducing food quality. Alternatively, the organisation structure can prevent caterers from achieving certain quality objectives due to a lack of management control over some parts of the production cycle, as occurs in hospitals. Finally, there are differences in the nature of the contact between customers and caterers. In institutions, the contact is much more long term and therefore more central to the quality of life. Customers can check out of a hotel, some customers are not free to leave a hospital or an army

The cases in chapter 7 describe situations in which innovation, or putative innovation, was introduced from the top down. This conforms to Larwood's (38) proposition that technological change should be initiated from the top but introduced first into those middle level departments where technology is most critical. It can then spread outwards to other
parts of the organisation. This model is clearly not appropriate to service departments nominally under the control of a senior middle manager whose functions are considered peripheral to most of the organisation's objectives.

Managers 13, 14 and 15 are all successful and highly regarded in their own organisations - particularly the latter two. Manager 13's success is more that of a survivor than that of a high flier. However, each of these middle managers has approached technological innovation as a highly political exercise. The political elements of the process are much more evident than in those hotel cases where a senior manager with direct line authority was associated with the innovation. The hotel innovations were accomplished more as an exercise in power.

As a further aspect of this contrast the political innovation of the catering managers was related much more to an opportunity than to a crisis. The favourable coming together of circumstances was so evident to manager 14 that he suggested that any attempt to repeat the performance at another time would have been unlikely to succeed. Thus the catering managers set out to match a predetermined technological solution to the right political problem environment. The hotel managers, forced to use the same technology for both operational and management information purposes, seemed more inclined to wait for a crisis problem environment.

It is evident too that the three catering managers had hidden objectives in personal terms which heavily influenced outcomes. Manager 13 needed a ploy to help him protect his position and the sophistry of computer technology was a useful enhancement to his status. He never had any real expectation that the machine would work properly as part of a management information system and he was more concerned to 'tame the beast' as it were. To monitor the personal threat at first hand and find ways of neutralising it. Manager 14 was concerned with personal power. The opportunity to engage directly on a technology project not only strengthened his position in the organisation but allowed him to observe changes in the balance of power within and between units. In the long run he may be associated with attempts to increase centralised control for his organisation through computers. Manager 15 is also concerned with personal advancement. The computer project not only helped her with her
Diploma in Management Studies but provided a route to an administrative career and an advancement that had become impossible in the catering field.

In consequence, although all three managers had a basis for evaluating the effect of the computer favourably, none of them actually did so explicitly in terms of information. Managers 14 and 15 were more interested in achieving decisions than in obtaining better information, which they seem to recognise as only a part of the decision making process. Terms used by the hotel managers such as 'quality' of information or 'balance' did not occur. This was not because the caterers were substituting the more immature terminology evident from the pre and mid computer managers analysed in chapter 3. Speed of decision making was no more important to them than to the hotel managers. An explanation may possibly be associated with the fact that each of them seems to see management much more as a continuing process, within which the elements of a decision accrue as part of a cycle of continuing actions, rather than a series of externally fomented crises to which an internal response has to be generated.

In other respects the patterns of innovation are remarkably similar. Although manager 14 undertook a formal search and evaluation procedure, neither of the hospital catering managers did so. In all cases, the attitude of the product champion, or the prime user in manager 14's case, was critical to a successful implementation. The successful implementation of manager 15 follows a similar pattern to that of manager 12. Strong commitment from the product champion, a determination to make the system work, prior consultation with staff and close involvement of staff with design and implementation. Equally, the indifferent implementation of manager 13 has many parallels with manager 10 as both seek to create conditions in which the technology cannot function well. The situation of manager 14 is more difficult to categorise and has elements in common with both successful and unsuccessful implementations within the experimental design.

There is nothing to suggest that the findings reported for the survey in chapter 6 are unrepresentative or misleading. The findings that emerge from the hotel case studies and from the discussions of earlier chapters
are not confounded by these case studies. There is no evidence to suggest that changes in technology are of themselves associated with changes in organisation structure. However, the closer involvement of these managers with their line operations did reveal some interesting power effects at the departmental level. Department managers were able to use the authority of a computer report to defend themselves against other senior managers.

Grid techniques continue to support the promise identified in earlier chapters. The values of the innovating manager, as revealed by the cognitive map of the cluster diagram, provide important insights into the way in which technological innovation is likely to be used. If a manager construes a tool or a technique closely in relation to devices that he or she uses for decision making, its eventual application will more probably have favourable effects. The extent to which those effects are favourable to the organisation depends on the congruence between personal objectives and organisational objectives.
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CHAPTER 9

Summary and Conclusions

1 The Strategy of Methodological Triangulation

This research set out to test the hypothesis that technological innovation with computers, by managers in the hospitality industry, is related to three factors. Prime amongst these are the values and the attitudes of the managers who might propose the innovation. Ways of thinking about the innovation are made explicit by the manner of its introduction. Secondary factors may then be used to support change by means of structural and/or procedural modifications to the organisation. Taken together it is proposed that these elements determine the effect of the technology. The third factor is some form of evaluation. Success may be evaluated objectively against some predetermined form of measurement and subjectively by the manager concerned against notions of utility and worth.

The research strategy employed to investigate these phenomena rests on three principal approaches. The three strategies were related to each other and were developed in the context of a theoretical framework derived from a discussion of the literature. The first research strategy involved a series of quantitative and qualitative measures based on a mail survey which was examined in relation to other surveys of managers and their attitudes to computers in both the UK and the USA. The second strategy drew on repertory grid techniques to investigate the pattern of constructs which hospitality managers hold in relation to decision making and decision support tools and techniques. Part of the data from these studies were quantified to produce construct maps which could be analysed for patterns and which could act as the basis of comparisons. Nevertheless, the "tone" of the data is primarily qualitative. The third strategy used case studies for the deep investigation of a particular instance of technological innovation. Grid techniques were introduced into the case material and were used for the development of insights into the way in which a management subject might perceive and structure the problem environment.
Thus the hypothesis was examined using a form of triangulation. Various forms of triangulation are possible and the technique used here, methodological triangulation, has a particular value to a student of management. As Trow observed,

"Every cobbler thinks leather is the only thing. Most social scientists . . . have their favourite methods with which they are familiar and have some skill in using. And I suspect we mostly choose to investigate problems that seem vulnerable to attack through these methods. But we should at least try to be less parochial than cobblers." (1)

Following a scheme offered by Zubir (2) the context of the three methods used can be seen to bridge two paradigms by which a social science investigation may proceed. These are illustrated in figure 37. The first is that of the traditional, scientific, "objective" approach, the second is that of the non-traditional, naturalistic, descriptive approach. In using three approaches, the purpose has been not to set the one against the other as a means of establishing a superior method but to use each as a complementary form of investigation. This is of particular value in the study of social processes such as management where the investigator shares a great deal with his subjects. The activities of one person cannot be entirely disassociated from those of another and this presents difficulties when seeking to agree and understand the meaning of those social objects which are called 'reality'.
FIGURE 37

Comparative Schema for Social Science Investigations

Paradigm 1

Traditional
Scientific
Experimental
Prescriptive
Reductionist

Experiment
Grid

Paradigm 2

Non-traditional
Artistic
Naturalistic
Descriptive
Holistic

Survey
Questionnaire

Case Study
Interview

After Zubir R.

P.R. Gamble
In such circumstances, many sources of potential research invalidity must be considered. Thus Webb (3), well known for his non-reactive research techniques by which an understanding of social behaviour is obtained without alerting subjects to the nature of an investigation, has argued strongly for "multiple operationalism as a way of knowing". He points out that every data gathering class in social science is potentially biased. There are reactive measurement effects such as, role playing, awareness of being tested and elicited response sets. There is the possibility of interviewer error, the effect of the interviewer on the interviewee and the effects of fatigue and practice. There is the possibility of sampling errors and the effects of changes in the population over time and between areas. There may be restrictions on content and again the problem of stability of content over time and over areas. Finally, there are problems of operating ease and the difficulty of validity checks. All of these problems are evident to any reader who would seek a coherent, universal theory of management or organisation. Conditions of theoretical uncertainty are therefore particularly suited to a triangulation method, as Denzin points out.

"The necessity of considering theoretical triangulation as an integral feature of the research process is shown in those areas characterized by a high degree of theoretical incoherence - contemporary theory in the area of small group analysis for example." (4)

The survey technique, reported in chapter 6 aims to identify the "world view" of individuals. Although subject to some of the biases already described, surveys are generally regarded as an objective method of data collection since research data may be interpreted on a purely numerical basis. However, it is common in social science work to support survey findings with other techniques, particularly case studies, to provide a qualitative view of the world and to provide a deeper investigation of the phenomenon under investigation.

According to MacDonald and Walker (5), the case study gives insight into specific instances, events or situations which portray the participant's experiences as they relate to their own circumstances, concerns or preferences. As a technique it is idiographic and phenomenological but it has a number of useful attributes. Rooted in the world of action, it is
strong in reality and allows the reader to consider the same process of judgement for understanding similar social or life situations. It allows for generalisation from instance to instance or from instance to class. It allows recognition of complexity and discrepancy between viewpoints. It provides a rich source of descriptive data which allows readers to judge the implications of actual actions for themselves. The use of case studies in this research has illustrated the advantages of many of these features.

Finally, repertory grid techniques were employed to explore personal views. A perspective of the personal was considered to be important in a topic so subjective as one which pertains to management decision making. Grids may be employed at several stages in a research investigation. At the preliminary stage they are useful for the formation of hypotheses, at the intermediate stage they may be used for monitoring the progress of the research and at the post research stage they may be used to reaffirm findings. A grid may therefore be used to illuminate quantitative data. In this study grid techniques proved to be an invaluable aid for the formation of hypotheses and for providing an illuminative bridge for interpreting the phenomena of a case.

This study therefore reaffirms the value of a combination of methods in overcoming the limitations that may restrict a study based on only one technique. The literature pertaining to the interaction of technology, organisational form, innovation and management decision making does indeed lack theoretical coherence. The perspectives obtained by this particular form of triangulation have proved both productive and worthwhile. The results obtained have been mutually supportive and broadly consistent. Conflicting findings may on occasion call for a further perspective but for this study it has been determined that the methodological base is adequate.
The hospitality industry is an interesting subject for a study of technological innovation with computers. Arguably it is one of the most important sectors of the British economy, being the largest employer of labour and a substantial contributor to invisible earnings and the balance of trade. Given the decline in the United Kingdom's manufacturing base, the importance of the hospitality industry may even be on the increase. Its enormous size belies its character. Problems of definition render precise measurements of its size and composition subject to debate and this is reflected in a lack of compatibility between official statistical measures. It is certainly large and important, whether it behaves as an industry characterised by some predominant technical or organisational form is much more questionable. The commercial sector for both accommodation and food service contains relatively few large companies and at best these control about one third of the market. The non-commercial sector accounts for a high proportion of food service situations, primarily in an institutional setting. Over half the industry's employees are part time, semi or unskilled. Whilst nearly three quarters of its entire workforce are female, over half its managers are male.

The educational level of managers in the industry is generally low. There are very few graduates and even, as a proportion, very few diplomates. Most managers of the many small establishments which offer hotel and catering services have undergone no form of further or higher education. Even managers of large units are unlikely to be qualified beyond the level of a diploma. Managers have therefore had little formal exposure to the design of information systems or to the use of computers as a management tool. At the same time, their predisposition to investigate such matters is limited by a perspective of the provision of accommodation and food services as an essentially personal affair, unchanged in its fundamental nature for many centuries. In some ways, the tired traveller of the 1980s is seen as satisfying the same needs for rest and sustenance that were experienced by participants in a census at the beginning of the Christian era.

In circumstances where competing products are undifferentiated, technology may be used as a device for achieving a competitive advantage. Indeed
this has occurred in the fast food industry where technological innovation, some of it based on the use of microprocessors and even, minimally, computers, has led to new approaches in the design and operation of food production and service systems. However, such innovation does not pertain principally to the information environment.

That hospitality organisations have survived may be taken as indicative that some forms of organisational development must have occurred in order to cope with changes in the external environment and changes in the needs of organisation members. However, if organisation development is defined as a function of ageing or simply as an adaptive response to external factors, then the extent to which insights may be developed as to its nature and import is likely to be limited. Organisations and the people who manage them would have been confined to a reactive as opposed to a proactive role in relation to external factors. Whilst this may be true in some situations it is hardly tenable for all situations.

Yet this is the very weakness that may be identified in the literature concerning the effect of technology on the structure and, to some extent, the behaviour of organisations. The reports of this literature in chapter 2 identify two principal approaches from the many researchers and writers who have considered the topic. The first of these, favoured largely by sociologists, focuses on a quantified analysis of correlations between measurements of elements of organisation structure and elements of technology. The second, favoured by what might be called systems theorists, presupposes a more holistic approach by trying to draw conclusions from case studies in which the context of technology in relation to other aspects of organisation development is examined.

It must be recognised that most of the literature pertaining to the effect of technology on organisational structure, whichever approach it favours, is concerned primarily not with technology but with structure. Technology is regarded as an exogenous, explanatory variable albeit one of considerable interest. No convincing reasons are offered as to why technology should determine form in any case. Given a tool of some kind, it is difficult to understand how it may possess of itself an imperative which determines the organisational framework in which it should be used. However, such determinism is implicit in many of the studies which are
reported. It is perhaps unsurprising that universal theories which relate technology to organisational structure are nowhere to be found.

Any such theory would have had to bear examination in a variety of organisational contexts so that its validity for a steel works could be demonstrated in the same way as its validity for a government department. The hospitality industry would have offered a particularly difficult proving ground for such a theory. Hospitality units use a variety of technologies and different structural forms within the framework of the same organisation. Between dining rooms and kitchens, service units and manufacturing units, different technologies and different structures are commonly employed. These structural forms are chosen for reasons which are sometimes far removed from technology. For example, it has been suggested that high task differentiation offers a means by which staff in hotels (and hospitals) might be protected from the anxieties associated with the provision of menial, personal services.

The extent to which technology affects structure depends on a number of circumstances. Some of these are inherent in the nature of the technology itself. Technology which is more sophisticated, complex or diverse will impinge more extensively on the process of which it forms a part. However, its effects may be modified by the intentions of the social actors responsible for its introduction and responsible for its usage. This argues for an action approach to the study of organisations which takes account of, coalitions of managers and workers, the nature of the organisation and the nature of the environment by which behaviours are influenced. The contingency approach, allowing for a purposive element on the part of the management of an enterprise, therefore offers a much more satisfactory position from which to consider the potential effects of managerial innovation.

In a similar way, the innovation literature mainly treats issues to do with the rate of adoption and diffusion of innovations but does not closely examine adopters and diffusers. Rates of adoption and diffusion are seen to be rooted in three areas. The first of these is the condition of the organisation itself. Latency to innovate is generally agreed to be a function of perceived environmental complexity moderated by factors such as organisation size and inter-organisation dependency. The second of
these is the character of the innovation itself. By and large, in the context of the hospitality industry these two factors might be seen to cancel each other out. Whilst the industry itself is largely positional, not given to considering future changes in environments, small computers are eminently trialable devices, easily afforded, tested, observed and compared.

The third area popular in the literature is the circumstances which favour successful innovation. From a comparison of a wide range of studies, a circumstantial list of such characteristics may be derived. The common denominator for successful innovations appears to be good marketing and communications within the organisation. The innovation should be seen to relate to some need or other. It is evident that successful innovation is also generally associated with the presence of a strong product champion.

The nature of the problem being addressed and the intentions of the innovator do not figure strongly. Thus the innovation literature has explored the purposes and intentions of adopters and diffusers in a framework as conceptually limited in terms of posture, as the literature of technological determinism. It is a fundamental proposition of this thesis that the attitudes of managers affect both the rate of innovation adoption and its effect on the organisation. Given the low rate of innovation in the hospitality industry and the postulated importance of management purposes, the research has explored some management attitudes and considered the level at which technological innovations with computers are affected.

3 Politics, Power and Decision Making

A further lack of clarity may be deciphered in considering the literature that has explored particularly computers, decision making and organisational effects. Essentially there is a lack of empirical distinction and some overlap between the treatment of computers for making decisions (for managers) and the treatment of deciding to adopt computers (by managers). Since neither the adoption or the decision making process are well understood, such a confusion is perhaps to be expected. The problem is complicated even further by two factors. The first of these is the nature of the device itself. The functionality of a computer may vary
according to the requirements of the user. Thus it may be used for custodial data processing or it may be used to manipulate and organise information for decision making. The second factor is that in some situations such as hotels, the main operational system through which the business generates most of its revenues and profits, is also the main source of management information. In a very critical system such duality complicates the design and may result in the sub-optimal attainment of one function or the other.

It is evident that a model of the decision making process which assumes a purely rational process on the part of decision makers is quite inadequate. It is apparent that managers use a great deal of soft data in groping their way incrementally not so much as to a decision but to a solution. Problem solving often seems to take the form of a solution for which managers must contrive a problem. The speed at which the solution is implemented then becomes a function of the circumstances under which it is recognised and the management level which recognises it. In this research two classes of circumstance have been observed. In one situation a crisis recognised by high level managers resulted in rapid solution implementation. In another situation an opportunity recognised by middle managers resulted in a more gradual solution implementation.

The process of implementing solutions for a computer innovation has therefore been seen to possess two principal ingredients, politics and power. While this may be true of a wide range of decisions, it is particularly cogent to decisions about information systems. Some information may be pertinent to some types of decisions but, as a general property, information confers both status and power on those who possess it regardless of its instrumental value. Thus the mere possession of information may alter either the status or the power of a manager whether or not he or she has any actual use for it. In this research, catering managers in possession of cost information from a computer were perceived to be better placed to defend themselves authoritatively from higher status managers, regardless of whether that information was actually accurate. Decisions affecting the adoption of an information generating device are thus doubly fraught.

The question that appears to emerge from all this is whether problems are
recognised in information terms or whether they are recognised in political terms. The extent and nature of any organisational influence resulting from the adoption of computer innovation depends on the answer to this question. If the computer is brought in as a political device to maintain or enhance status, to satisfy other members of the organisation, to demonstrate very simply that the manager is a technological person able to cope in the modern age, to act as a vehicle for change, then its effects are likely to be predominantly political. If it is brought in as an information device then it is more likely to impinge on the quality of management decision making. The two roles are not always mutually distinct but an important finding of the research is that where the political purposes are to the fore, the effect of a computerised information system on decision taking can be so small as to be almost negligible. However, this does not mean that the manager will see the innovation as unsuccessful. On the contrary, in one case this neutral impact was both sought and valued.

Such a finding is considered to be a useful contribution to the literature. The terms 'politics' and 'informal organisation' are employed with a degree of conceptual forbearance that stops little short of a muddle. Almost any indistinct organisational process or background manoeuvring may be labelled in this way. The present study traces these effects and relates them to the likely motivations of the managers concerned.

4 Utilisation of Computers and General Attitudes to Computers in the Hospitality Industry

The prognosis for a more effective use of computers and higher rates of adoption in the UK hospitality industry are not encouraging. The highest level of penetration for microprocessor based devices is in areas which are concerned with custodial processing, namely point of sale systems. The application of general purpose computers is concentrated on clerical aspects of data processing such as accounting, reservations and stock control. Noticeably these applications cannot accurately be referenced by higher level functions such as financial management, demand management and production management. Thus the systems cannot generally be justified in tactical or limited strategic terms but perhaps at the more pedestrian
level of "better control" or "displaced labour". As far as can be determined, neither of these latter conditions have been demonstrated empirically by the hospitality industry. The conceptual redefinition necessary to alter these circumstances, whereby the information needs of problem environments are explicitly recognised by hospitality managers, does not appear to be imminent.

The potential market for hotel front office systems remains substantial despite saturation in some sectors. Even by the most optimistic reckoning, two thirds of hotels are not using computers in front office areas. Given that an additional third state their future intentions to introduce systems, a potential market of at least 1,000 additional units can be identified, counting only those licensed hotels with more than 25 rooms. More broadly based estimates would of course be larger. Given existing budgets for hardware and software in the hotel industry this is worth in the order of £18 million and most of these systems would be based on microcomputers. The market for catering information systems is even larger since penetration levels are lower and the number of units greater. As many as 300,000 units could be in the market for systems.

Hospitality managers are generally satisfied with the computer systems with which they are supplied, especially the hardware. Without being strongly positive they are quite satisfied with the software in that it meets their expectations. However, they are not impressed with the level and nature of training that they receive. Given that only 20% of managers have received formal academic training in this area and that 25% of hospitality managers still have no contact with computers at all, the importance of training and of personal development emerges.

However, it appears that hospitality managers are doing little to develop their knowledge base formally. Their scanning mechanisms are largely passive and do not concentrate especially on the topic of information technology and there is no reason to believe that hospitality businesses are more adept than other sectors of British industry when it comes to formulating or implementing strategies for the introduction of information technology. Indeed the survey results from this research show a remarkable consistency between investigations of other managers and managers in the hospitality industry.
Thus, despite their lower educational levels, there is little indication that hospitality managers differ in their behaviour towards information technology from other managers. Where data are available for service industries then even more consistencies can be found. Whilst scanning levels in the hospitality industry tend to be lower and less active than in other industries, this is merely a matter of degree. Levels of computer utilisation are not markedly lower. Surprisingly, even general attitudes to computers did not show significant differences when compared cross culturally with general attitudes of a group of American professional persons.

Differences were encountered between American professional persons and British hospitality managers in statements concerning the use and acceptability of computers to their business and themselves. In particular, the American subjects were less worried about the use of computers in society and were less inclined to see themselves as an inhibitory factor in rates of adoption. This difference may be ascribed to culture, environment or a separation of four years between the two studies. However, the finding that British hospitality managers see themselves as the principal barrier to the introduction of computer based systems is consistent with other surveys of British managers conducted in the last four years. There is also some indication that women managers in the hospitality industry feel a greater sense of alienation and anticipate more difficulties with information technology than their male counterparts.

The finding is significant if studied in relation to the integration of planning and operating systems necessary in the hospitality industry. If managers are the principal inhibitory factor in the design and implementation of computer based information systems for the hospitality industry, an issue identified by the managers themselves, then the concerns which underpin these inhibitions must be understood before they can be reduced or removed. Effective innovation cannot take place if managers do not form positive expectations about themselves in relation to the innovation.
Computers and Innovation in the Hospitality Industry

Chapter 9

The Nature of Managerial Innovation with Computers in the Hospitality Industry

Moving from the world view perspective of the survey, 9 comparative repertory grids and 6 case studies with 6 further grids were used for deeper study. These studies provided data which supported the findings of the survey.

The 9 grid interviews reported in chapter 3 were used to refine initial hypotheses and to provide a point of comparison with the case studies. Subjects based on Indian, Malaysian and British managers were labelled respectively as pre-computer, mid-computer and control managers denoting the status of the business environment in relation to the use of small computers. These were taken to correspond to the situation in the UK in the late 1960s, the late 1970s and of course the control group were contemporary.

The pre-computer and mid-computer managers were all from the hotel industry and compare occupationally with the first 3 case studies. The survey indicates that despite their lack of formal training and despite the limited personal development which they undertake in relation to information technology, hospitality managers are disinclined to use expert, outside advice when it comes to innovating with computers.

The pattern of the three hotel cases was similar. The problem which the computer system was to address was not recognised until a crisis was encountered. In each of the three situations the crisis was of major proportions. In the first case there was the imminent total collapse of the billing procedures. In the second the rejection of sound technical advice on the grounds of reduced cost led to installation of a system that failed within 48 hours and was replaced by a system that failed again within months. In the third, operational procedures had already collapsed with catastrophic financial and operational consequences.

In each case the authority and responsibility for the technological innovation was taken at the highest level of units in which the managers had a great degree of autonomy. This may therefore be regarded as effectively the highest management level. However each manager had a
tendency to distance himself more or less from the selection decision and to draw on the advice of an "expert" from within the organisation. The less successful innovators passed the role of expert to the financial controller. The successful innovator who was more active in the selection decision himself used both his financial controller and another senior line manager.

The character of the selection process was very much that of matching a solution to a problem. The search process was by no means exhaustive, overtly rational or free from external influences. Thus a limited range of systems was examined and factors such as other computers used in the group, the past experience of superior managers and the commercial requirements of another division of the parent company were allowed to influence choice. In two of the cases there was little expectation that the computer would contribute to the information environment or to decision making. The selection and evaluation was carried through on the personal power and authority of the senior manager. In none of the cases was there extensive internal consultation prior to implementation. However, following the selection decision, the successful innovator began to market the choice internally.

The pattern of the three catering decisions was also similar but in marked contrast to that of the hotels. The catering cases were all based on middle managers in large, bureaucratic organisations. The catering function was not seen as central to any of these organisations so that a catering manager suffered a loss of both status and power in consequence. The nature of the catering information system itself was not seen as central to the functioning of the catering department which could continue to produce meals without its services. In a hotel, the failure of the front office system presages a total system failure.

In these circumstances the nature of the innovation decision was opportunistic and depended for its achievement not on power but on adroit political manoeuvring. This parallels the case of another bureaucratic organisation, the US State Department, which used the opportunity of the Cuban missile crisis to get itself a new communication system. The catering system specification became part of this political process and was used to exert leverage on the organisation as a whole. Almost in
passing, the selection and implementation decision was considered far more carefully with close involvement of the managers concerned.

A final point of contrast with the hotels is that the caterers either came to the conclusion or recognised immediately that a phased implementation was preferable. This may be seen as an aspect of politics in the case of the catering managers who were applying a political process to the introduction of change at operational level. Indeed, in one case example this phasing and political posturing was so tenuous as to extend over a period of several years.

6 Some Characteristics of Successful Innovation

6.1 Computers and Managerial Decision Making

The principal finding of the research is that successful innovation with computer technology appears to be associated with managers who construe the computer in relation to a decision making process. This pattern may be identified by a combination of grid analysis and personal interviews. The key element in this assertion is the identification of the decision making process. Superficially it would appear that personal judgement is central to any decision. Thus the discovery of a manager who was clearly unsuccessful in using the computer for decision making but who appeared to construe computers in relation to personal judgement was confounding. However, subsequent analysis revealed that in his particular case, personal judgement was not a tool that had much importance in so far as decision making was concerned. The successful managers were identified as those who construed computers closely into a tool or a technique that was important to their decision making behaviour. Principally this might be personal judgement but it can also be shown to apply to small group discussions.

This notion is important because the grid interviews repeatedly showed that managers have difficulty in viewing decision making as a discrete event. Many managers see decision making as a process and their role as one which plucks decisions from a continuing cycle of activities. If computer based information systems are germane to this process then they are more likely to contribute to the decision making activity, whether or
not the manager is accustomed to using relevant information based procedures.

6.2 Computers and the Representation of Information

In none of the cases studied could the computer based procedure be said to have reshaped the information on which decisions were based, regardless of the stance of the manager. Even the Catering Information System merely turned an unreal idea, the food cost percentage, into a usable datum. Hotel managers in particular see themselves as operating in very complex information environments. There appears to be a tendency to withdraw from that complexity by representing it in a very simple way. Thus each of the hotel managers used a "manual bridge" between themselves and their formal decision support procedures. This involved transcribing a subset of data by hand either personally or by a subordinate. In some instances this was transcribed from a large table of computer generated numbers. In another case the manager reduced a large table to a simple pictorial form. In all three cases the managers used a small subset of data for forming decisions. They described the process as 'doing their part' or obtaining a 'feel' for the data.

Such a procedure bears rationalisation in some ways. If the information environment is so complex that it cannot be represented completely in a sophisticated way, then a simple, approximate representation is likely to be as useful. If that is indeed the case, the position described may be seen as mature and balanced. However, it is not at all certain that the information environment in which these managers operate has been exhaustively examined to determine the degree to which it may be understood. There is no evidence that attempts have been made to understand it and in particular, computer based procedures have not been employed in this way.

Thus a restraining factor may be identified. Where computers are construed as clerical or mechanical devices, related to rapid arithmetic like calculators, related to communication like telephones or related to text reproduction like copiers, then the potential of computers as an information device as opposed to a data device is not recognised. These conditions set an "upper limit" to the contribution that computers may
make. The problem is complicated by the fact that changes in the representation of information may of themselves be associated with a decline in decision performance if managers are unable to change their problem representation to correspond.

6.3 The Effect of Computers on Organisation Structure

It is apparent from the case studies that in the hospitality industry, the implementation of a computer based procedure will affect the organisation only in so far as the intentions of the product champion will allow. In the hotel cases, the effect of even major computer installations used to drive almost all the procedures in a hotel, appeared to have no organisational effects at all.

The catering computers were each intended for a political effect and achieved their political end, regardless of any actual contribution they may have made to the operation of the catering systems of which they were a part. In each case, the use of a computer based procedure conferred additional status to the manager with whom it was associated. In two of the situations studied, this allowed the manager to advance his or her career and in the third it protected the manager from the effect of other organisational changes. The authority of computer generated reports also allowed the catering managers to defend themselves more successfully against higher level administrators.

More organisational effects were associated with the catering computers at operator level. In each case the kitchen staff reacted to the introduction of a computer by considering their recipe formulations more carefully. This appears to be the result of the computer making these recipes relevant to the production process for the first time. Under a manual procedure strict adherence to standard recipes cannot be enforced. It may be possible to generalise this phenomena and suggest that the organisational effects of computers will be experienced in relation to the extent that they change the perceived relevance of procedures.
6.4 An Action Approach to the Design of Systems

It is apparent that in the two cases identified as examples of successful innovation, there was much greater involvement in the actual system design by a wide range of operators and managers. Thus although the hotel system was purchased as a complete package, the hotel general manager claims a great deal of ownership in the system due to enhancements made after purchase through the contributions of himself and his staff. Thus the hotel used the software services of a sister company to bring about evolutionary change related to the perceived needs of the hotel. Other systems that the hotel used were also evolved in a similar co-operative fashion, hotel 'experts' sparking off software 'experts' to design systems incrementally. The direct involvement of the relevant line managers may be important in this process.

Due to this researcher's role in developing the Catering Information System, the participation of the successful catering manager and her staff could be carefully monitored. Once again, given a basic system design which was itself evolved in close collaboration with the manager herself, changes were introduced in response to the requirements of the catering staff, as they emerged.

Whether the benefits derived from this process are a function of better system design or improved commitment on the part of users deriving from a greater sense of ownership, cannot be determined. However it is apparent that an "action approach" to systems design is unusual in the hospitality industry and the passive grafting of an established design onto an existing procedure may account for some sources of dysfunctional behaviour. This is not to argue that all computer systems in the hospitality industry should be written as custom systems. It is to suggest that careful attention must be paid to the development of commitment and ownership, and to monitoring attitudes, if new systems are to work well.
Implications for Future Research

From this work, a number of directions suggest themselves for future research. The first of these is clearly the application of repertory grid techniques more widely in the design and development of computer based management information systems. The grid techniques lend themselves to monitoring the attitudes of principal actors in the use of the system before, during and after installation. This will allow system designers to monitor attitudes to the use of the information system in relation to decision making procedures. Grids may also allow monitoring of other changes important to the success of the system such as, increased openness in patterns of construing that may presage a reformation of attitudes, reduced levels of defensiveness and hostility and, possibly, a more productive relationship between the tools and techniques used for decision making. In a worst case situation, where a manager is not amenable to change, the grid can be used to identify attitudes which are highly valued. System outcomes which reinforce those attitudes can then be stressed so as to increase future acceptability.

Of course, a fundamental prerequisite for the performance of an information system is a manager predisposed to the use of relevant information for making decisions. If the manager does not use or does not value information based procedures then an information processing system is of no inherent value. Grids may have a useful role in this context also. From the research that has been carried out it is evident that the way in which a manager construes computers can reveal important guidelines to their attitudes. Whilst further research is necessary to validate this idea in different occupational roles, it appears that a grid will provide guidance in two important areas.

First, the richness of the pattern of construing, the extent to which the manager can differentiate computers from other tools and techniques, might provide a measure of latent comprehension and possibly, creativity. If a tool is perceived in a limited fashion then many of its potential applications may be overlooked. Perhaps the computer industry is a victim of its own success in this respect. Anxious to reduce the threat potential for prospective computer users, computers have been sold to hospitality managers as simple, easy to use devices for which little...
technical knowledge is required. A manager who knows little yet believes that is all there is to know, is neither going feel impelled to call on competent professional advisers or to imagine that the device has a potential to deal with complex problems.

Secondly, in situations where managers are being selected for work which involves computer based information, the grid pattern of prospective candidates may be compared with those of managers known to be successful users of such systems. In this context the term successful means that their performance matches up to goals valued by the organisation. For development projects, selection of the right candidate can have an important bearing on likely levels of success.

As an aside, it may be worth investigating further the extent to which management career patterns in the hospitality industry impinge on low levels of innovation. This is not an area addressed in this research but attitudes to management development reflect the values associated with organisational goals. It may be contended that career patterns in the hospitality industry follow the progression of a series of short term appointments. Small unit size tends to limit career prospects in any one hotel or restaurant. Manager ZZ2 alluded to this problem even in the context of his 800 bedroom, £16 million per annum business. In consequence, ambitious managers seek short term goals which will lead to rapid promotion. They tend to avoid projects which result in benefits for the organisation in the long term or which require long term developments. Most information systems possess both these attributes so that for the more ambitious manager there is an actual disincentive to become associated with such projects on their way to the top.

Some of the most interesting developments likely to affect the hospitality industry are those pertaining to research on knowledge based systems. It is immediately evident that the acceptability of such systems in the hospitality industry will be severely hampered in situations where managers construe computers in relation to devices like telephones or calculators. However, this research does indicate directions in which more sophisticated systems may be made more acceptable.

From the cases investigated it appears that there may be an argument for
designing systems which allow the manager to complete some of the analytical stages of a procedure. This will enable a manager to 'do his or her part' or acquire a 'feel' for the information. The nature of this stage can be altered as the manager becomes mature. Thus initially the system design may require an operation to be carried out by hand, written on paper. This may be of particular importance to the hospitality industry at this stage of its development. Many managers see their business as providing personal services and they support them with personal decision making. As a progression, the manager may direct the machine to manipulate the information on his or her behalf. Finally the manager may allow the machine to present the information in its final shape, ready for decision making.

There is a great deal of further research to be carried out into the relationship of ideologies, values and decision making since the literature on these related topics is very sparse. Thus it would be most interesting to evaluate the comparative attractiveness of systems which offered to undertake a "chunked off" block of service from the beginning. A corollary to the previous point is that managers may not trust existing systems because they are still seen to require manual intervention. The balance between these two positions remains to be determined. Clearly much research potential has been identified elsewhere to do with the interaction between the manager and the machine, the amount of information to be represented and the form of representation for a given problem.

More directly, work in this general area suggests improvements that could be made in the grid analysis technique itself. The Monocle program appears to produce useful and sensible cluster patterns but, written in BASIC, it is complex and subject to several shortcomings. Given the understanding which this first attempt has engendered, it would be interesting to rewrite this program in PROLOG. A logic programming language would probably be much more satisfactory for an application that draws on a descriptive, as opposed to a statistical, interpretation of data. It is apparent that a dendrogram lends itself to representation as a tree which is a fundamental data structure in PROLOG. In particular the backtracking features of PROLOG would probably be more successful at finding all possible cluster combinations where more than one equally valid representation exists. This would be useful for the analyst in
pinpointing areas where deeper investigation is required.

Whether this work could be extended to encompass other aspects of grid analysis is more speculative. Certainly an expert system for grid elicitation could be written in PROLOG since this has been done already by other researchers in BASIC. Whether a complete expert system for grid analysis can be written is more speculative, though a partial system able to produce general guidance is probably possible.

Equally speculative is the extent to which computer based systems might be developed to support the provision of service in the hospitality industry. Some experiences are essentially human, not least of which is the experience as being treated like a person by other human beings. A meal purchased from a vending machine and eaten in isolation is a different experience to a meal taken with friends in a restaurant. On the other hand, the nature of service and the basis of personal provision is not well understood by the hospitality industry. There may be circumstances in which no-one will know or care if a meal is prepared by a computer or if a bedroom environment is maintained by a computer.

Further research is required to investigate the nature and perception of personal service. In the final analysis it may be that the complexities of the demand management of services are too complex to be dealt with by a person. Other industries have found ways of extending personal services through the application of technology, a credit card offers more service than cash. The hospitality industry has undertaken very little investigation of potential roles for computer systems either to support decision making or to support the provision of personal services. In view of the increasing importance of the hospitality industry within the world economy, the need for an understanding of these phenomena grows more urgent.
Computers and Innovation in the Hospitality Industry

Chapter 9

References


ALGORITHM
A formal procedure for solving a problem.

APPLICATIONS SOFTWARE
Computer program or programs written for a purpose other than the operation of the computer itself.

ARTIFICIAL INTELLIGENCE
An area of computer science concerned with programming computers so that they have attributes associated with intelligence. AI systems usually have some ability to devise their own rules for solving problems and for learning.

AUDIT PROCEDURE
A procedure to validate controls and to ensure that control procedures are being implemented. A historical review of events.

AUDIT TRAIL
Record of transactions that occurred in a procedure.

BACKGROUND PROCESSING
Refers to the execution of lower priority programs in order to maximise utilisation of processing capacity. Thus a word processor may be told to print a report as a background job while simultaneously, another file is being edited.

BACKUP
A copy of a data file or a program used in case of the failure or corruption the original.

BASIC
Beginners All Purpose Symbolic Instruction Code. A popular high level language available on almost all small computers. May be offered under an interpreter or a compiler. BATCH The process of grouping similar types of work, so that they can all be undertaken at the same time, hence batch processing. Usually employed for large computer systems and/or where there is a desire to utilise a machine intensively. Contrasts with interactive processing.

BIT
Short for Binary Digit, a 1 or a 0.

BBUBBLE MEMORY
A semiconductor device able to store data even when not powered up. Potentially an attractive alternative to disk storage for data and programs since it would be, faster, more compact and more reliable.

BUG
An error in a computer program.

BYTE
A collection of bits handled as a set. Normally 8 bits are used to make one byte. Capacities and rates are often expressed in numbers of bytes.

CHARACTER CODE
A letter, number or symbol. Along with all its other meanings it is usually taken to refer to program statements. Here the "code" is a way of writing program commands more efficiently.

COMPILER
A computer program which translates computer programs. Thus statements in a "high level" language like BASIC may be translated into machine code by a compiler. The process of compiling produces object code, which a computer can execute directly, from source code.

CONTROL PROCEDURE
The method by which performance is directed to conform to plans. Thus control procedures operate before outcomes have taken place.

CP/M
An operating system which was so widely used on 8-bit computers that it is almost a de facto standard. Owned by Digital Research Inc. since 1976, the letters are usually taken to stand for Control Program/Monitor.
CUT OVER PERIOD  An interval during which a transfer is made from one basis of operations to another. Thus the switch from a manual to a computer based procedure, involving setting up data files on the machine, would be a cut over period.

DATA PROCESSING  Normally taken to mean the processing of commercial data by a computer. Technically, a computer does not have to be involved since a person can process data.

DATABASE  A set of data organised so that they may be easily maintained and accessed. Usually the database is a file or set of files which are linked together to permit convenient updating, ease of interrogation and efficient reporting.

DISK  A form of secondary or backing store for a computer. Disks are magnetic media, divided into circular tracks (grooves). They are rotated by a disk drive and accessed by means of one or more read/write arms. Several types of disk are available classified according to hard vs. floppy and fixed vs. exchangeable.

DISK OPERATING SYSTEM  Often abbreviated to DOS, these are important computer programs which organise the storage and retrieval of programs and data on a disk.

ECR  Electronic cash register, a billing machine controlled by a microprocessor.

ELECTROMECHANICAL  A machine which utilises both electronic and mechanical components, such as an ECR (the printer parts are mechanical).

ELECTRONIC MAIL  The distribution of communications such as memos, letters messages and reports by electronic means. Usually this implies direct connections between computers and/or word processors.

EXPERT SYSTEM  An applications program which has been designed to identify relationships and to draw inferences from sets of data with which the computer is supplied. Also known as an IKBS, information knowledge based system.

FILE  A collection of data which are logically related and which are treated as a physical unit. Thus the personnel file would contain all the personnel records.

FILE ACCESS  The act of reading from or writing to a file.

FILE UPDATE  The act of making an entry (changing a record) on a file.

FINANCIAL PLANNING SYSTEM  A special kind of computer programming language designed for producing financial reports.

FLOPPY DISK  A flexible, magnetic storage medium for data and programs. May be spelled as disc and may be referred to as a diskette. Floppy disks range in size from 8", to 5.25" (a mini-floppy) down to about 3.5" (a micro-floppy). Relatively inexpensive, they provide a means of supporting direct access files on small computers. See also disk and direct access.

FRONT OFFICE  The reservation, reception and billing areas of a hotel.

GRAPHICS  Output which is not text or numbers. It may take the form of a chart or a picture.

GUEST HISTORY  A file containing the personal and visit details of both

P.R. Gamble
individual and organisational users of a hotel service. May be maintained for rooms, food and beverage and banqueting.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>HARD COPY</td>
<td>Printed outputs from a computer. As opposed to the soft copy, the transient displays, presented by a VDU.</td>
</tr>
<tr>
<td>HARD DISK</td>
<td>A sealed disk unit with large storage capacity. HARDWARE. The physical equipment of a computer system.</td>
</tr>
<tr>
<td>HIGH LEVEL</td>
<td>When describing a language, infers that it uses English like statements. BASIC is a high level language.</td>
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<tr>
<td>IKBS</td>
<td>See expert system.</td>
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<tr>
<td>INFORMATION</td>
<td>TECHNOLOGY Usually taken to refer to the cultural and social impacts of technologies in the areas of electronics, computing and communications.</td>
</tr>
<tr>
<td>INFORMATION</td>
<td>When data have been structured they become information. Thus information is data which has acquired meaning. This is the difference between a pile of books and a library, or a sequence of numbers 140284 and a date (14th. February 1984).</td>
</tr>
<tr>
<td>INTEGRATED SYSTEM</td>
<td>A set of related procedures which requires that data be captured only at one point but which maintains sets of files that can be accessed in common.</td>
</tr>
<tr>
<td>INTERACTIVE</td>
<td>A computer system or program which responds to a user immediately i.e. without a noticeable delay.</td>
</tr>
<tr>
<td>INTERPRETER</td>
<td>A computer program which translates statements from a high level language into machine code, for execution by the computer. An interpreter acts on each statement only as it is encountered, unlike a compiler which turns the entire program into machine code as a block. Interpreters provide a good environment for developing and debugging programs since they allow the programmer to work interactively.</td>
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<tr>
<td>KILOBYTES</td>
<td>1,024 bytes, $2^{10}$ bytes. Often abbreviated to Kbytes.</td>
</tr>
<tr>
<td>LOCAL AREA NETWORK</td>
<td>A general description of a computer network which operates over a small area. May be abbreviated to LAN. Exactly what constitutes a local area is somewhat speculative. Distances from a few feet up to several miles all seem to qualify for this description.</td>
</tr>
<tr>
<td>MACHINE DEPENDENT</td>
<td>A program which calls on specific attributes of a device, thus limiting its application to certain kinds of hardware.</td>
</tr>
<tr>
<td>MAN/MACHINE INTERFACE</td>
<td>The boundary between the machine based procedures and the people who have to operate it. Refers not only to the physical interface like the VDU screen or the printed page but also to the behaviour of the system in respect of users.</td>
</tr>
<tr>
<td>MATRIX</td>
<td>A two dimensional array such as a table of numbers. May also describe the set of print hammers in a print head.</td>
</tr>
<tr>
<td>MEGABYTES</td>
<td>MEMORY 1,048,576 bytes or $2^{20}$ bytes. May be written as Mbytes. The storage capacity of a computer. May be called main memory.</td>
</tr>
</tbody>
</table>
| MICROCOMPUTER | A small computer, based on a microprocessor, including equipment to enable it to store workable commercial.
MICROPROCESSOR
A central processing unit (CPU) based on an integrated circuit design. It does not normally include memory and input/output logic though the number of functions which are being built into microprocessors is increasing.

MICROSECOND
One millionth of a second.

MILLISECOND
One thousandth of a second.

MINI-WINCHESTER
A small (5.25" or 3.9") diameter winchester q.v. with capacities typically in the range 5 to 40 Mbytes when linked to a small computer.

MINICOMPUTER
A computer somewhere in size between a microcomputer and a mainframe. It is difficult to produce a better definition as technological advance changes the capabilities of machines. The PDP-11 manufactured by DEC (Digital Equipment Corporation) is probably the most famous minicomputer.

MIPS
Millions of instructions per second. A measure of performance speed for computers.

MOUSE
Hand operated, electronic or electro-mechanical device for directing the position of a cursor.

MS-DOS
An operating system developed by the Microsoft Corporation widely used on 16-bit microcomputers. Closely related to PC-DOS used by IBM Personal Computers.

NANOSECOND
One thousand millionth of a second.

NESTING
The process of embedding one set of data or one set of program instructions, within another.

NETWORK, COMPUTER
A series of interconnected computer systems. See local area network.

ON-LINE
Connected to and communicating with, a computer. The opposite of off-line.

OPERATING SYSTEM
An important and sophisticated computer program which controls the overall operation of a computer including data management, data storage, scheduling, input and output. Often abbreviated to OS or DOS (disk operating system).

OVERLAY
Generally a segment of a large program suite which is brought into memory when it is needed and which displaces the current segment. Thus a program suite may comprise say three segments, one for data entry, one for editing and one for printing reports. These overlay each other in the computer, usually without the user having to be aware of what is going on, depending on the actions being carried out.

PACKAGED SOFTWARE
A computer program ready written for a general class of applications. A word processing program would be purchased as a package. Software packages can be purchased "off the shelf" for use by anyone who considers them a suitable approach to solving a problem. Packaged or canned software is much cheaper than specially written or custom software because it sells in larger quantities.

PERIPHERAL
A piece of separately identifiable equipment, connected to a computer system. Printers, plotters, VDUs and disk
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>PicoSecond</td>
<td>A million millionth of a second.</td>
</tr>
<tr>
<td>Pointer</td>
<td>An item of data which contains the location or address of another item. The numbers in the index of a book point to the page on which information may be found.</td>
</tr>
<tr>
<td>POS</td>
<td>Point of sale device such as an ECR.</td>
</tr>
<tr>
<td>Program</td>
<td>A set of instructions given to a computer in order to direct its performance. The instructions usually take the form of statements and the performance is usually concerned with problem solving. The instructions may need to be translated by another program before they can be executed.</td>
</tr>
<tr>
<td>PROLOG</td>
<td>PROgramming in LOGic. A declarative computer language suitable for rule based systems and widely used for artificial intelligence work.</td>
</tr>
<tr>
<td>Rack Rate</td>
<td>The published price of rooms in a hotel. Not necessarily the price at which the rooms are sold to different classes of buyer.</td>
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<tr>
<td>RAM</td>
<td>Random access memory. Sometimes referred to as read and write memory. The part of a computer’s memory that can be used by an operator for storing programs and data. The contents of a RAM are lost when the power is turned off.</td>
</tr>
<tr>
<td>Random Access</td>
<td>An alternative description to direct access. It implies a method of storing programs or data which enables the computer to retrieve any item in a similar amount of time, regardless of its location.</td>
</tr>
<tr>
<td>Record</td>
<td>A set of related data items which are considered as a unit. Groups of records make up a file. In turn, records are made up of fields. An individual account would constitute a record in an accounting file.</td>
</tr>
<tr>
<td>Reservations Rack</td>
<td>A set of slips of paper, kept in a rack and filed in date order, containing summary details of hotel reservations.</td>
</tr>
<tr>
<td>Rooms Rack</td>
<td>A set of slips of paper, kept in a rack and filed in room number order, containing summary details of guests staying in a hotel.</td>
</tr>
<tr>
<td>Routine</td>
<td>Section of a computer program to perform a particular task. Synonymous to a sub-routine. Routines may be re-used during the execution of a program and avoid the need for programmers to repeat sets of instructions to a computer.</td>
</tr>
<tr>
<td>Secondary Storage</td>
<td>A term used to refer to magnetic disks or tape which act as the filing system of a computer. Such storage is secondary to the computer’s main memory. Although it is slower for a computer to retrieve data or programs from secondary storage, the medium is much cheaper and is non-volatile.</td>
</tr>
<tr>
<td>Security</td>
<td>Prevention of unauthorised use. More usefully considered in terms of the features of a computer system (hardware and software) which protect the user from the threat of accidental loss of programs or data.</td>
</tr>
<tr>
<td>Software</td>
<td>Most usually a description of computer programs but may also encompass data.</td>
</tr>
<tr>
<td>Software Engineering</td>
<td>The process of developing software, cost effectively.</td>
</tr>
<tr>
<td>Software Maintenance</td>
<td>A euphemism for the modification and correction of a computer program or program suite.</td>
</tr>
<tr>
<td>Source Code</td>
<td>The computer program as it is written by the programmer.</td>
</tr>
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Most programs are written in a high level language which are easier for people to learn. The statements are sometimes described as English-like. Source code is then translated into machine code (object code) by an assembler or compiler.

**SPREADSHEET**
A computer program designed to calculate a set of data laid out in the pattern of a ruled sheet of paper. Users may define the relationships between boxes, formed by the intersection of rows and columns, flexibly. Typical applications of spreadsheet packages include, financial planning, budgeting, stock control and menu costing.

**STAND-ALONE SYSTEM**
A computer system which is dedicated to a particular procedure or set of procedures. A computer dedicated to supporting a banqueting department might be described as a stand-alone system.

**STANDARD RECIPE**
The fixed formulation of a dish representing the technological control of a recipe.

**SYSTEM**
A set of related parts which must be considered as a whole in order to appear meaningful. Typically, the term is also used to describe a set of computer equipment such as a processor, disk drives, VDU and printer.

**TERMING**
The procedure of adding apartment charges to guest bill folios.

**TREE**
A data structure consisting of a series of connected nodes.

**USER FRIENDLY**
Description of a computer program which is considered to be easy to learn and use. In this context, the program allows the operator to behave in the way that seems most comfortable, is able to respond to commands given in a variety of different ways, can provide assistance to an operator if help is required and displays constructive and supportive, diagnostic messages if an error is made.

**WHITNEY SYSTEM**
A set of procedures, devised by the Whitney paper company of New York, for recording and filing summaries of reservations and registrations in a hotel. This involves typing on many slips of paper which are mounted for safe keeping on little racks or frames. Hence the term room rack or reservations rack.

**WINCHESTER**
A non-removable, high density, hard disk. The term was originally coined by IBM and is now generally attached to disks of 14" or 8" diameter, typically capable of storing between 25 to 100 Mbytes of data.

**WINDOWING**
The term used to describe the process of focusing the attention on a part of a display or report. The VDU screen may often be conceived as a window which looks on to a part of a page or report. Many computer programs allow users to define their own windows and to examine these elements of the work space as required.

**WIMP**
Window, Icon, Mouse, Pull down menu. An acronym for a style of man/machine interface developed by the Xerox Corporation and made popular by Apple Computer Corporation. Usually associated with the use of a mouse.
A thesis submitted by
Paul Robert Gamble
in fulfilment of the requirements for the award of the degree of Ph.D.
in the Department of Management Studies for Tourism and Hotel Industries
University of Surrey
1986
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Appendix 1

Listing of Gamble’s Grid Generator Program
for the 48k Sinclair Spectrum Computer

490 LET test=0. CLS
1
495 INPUT RT 0,9; P R P E R 1; ink i
uou liKe to see the
i
demonst r a t i o n run?
" •$: IF a $ = “y" T H E N GO SUB 60 0 0
I
497 IF tes t= 1 THEN GO T O 535
‘500 CLS : INPUT "NUMber of cons I
tructs (<= 1 0 )?
con
\
510 IF con >10 THEN GO TO 500
!
520 INPUT "Number of el e m e n t s <<
<=15)7 " ; e t
5
525 IF el >15 TH E N GO TO 520
535 LET lab-3
5 4 0 IF c o n <=5 THEN LET t a b - 5
545 LET ncon=0: LET n e t — 0 ; LET
nranK=0: LET name-0
550 LET points=con
555 LET s iie = cont 2
560 DIM g (Size, 2 ); REM graph
H®® REM f t f t f t f t f t f t f t f t f t s - *
605 REM ft Ei>;ter des c r ip t.ions
*
SI© REM ft4
ft*ftftftftft* ft
*
620 IF tes tVl .THEH G O T Q 10 20
.6X30, BORDER. 2;. P A P E R - 2 tC
LS':
640 PR I N T RTF 0 ,0 ; B R I G H T 1
6 ."Uoutd

100
105
10?
109
110
120
130

REM ftftftftftftftftftftftftftftftft
ft ftftftft
REM *
G R M B L E 'S
*
REM *
GRID
*
REM ft
GENERATOR
,, ft
REM tftftftftftffftftt-fttft-ftftftftf-f-tf
REM
BORDER 0
P A P E R 0. INK ?; C

~ 14-0 FOR i =0 T O 31: PR I N T RT 0.i
, “ ft": PRINT RT 2 1 (i ; " ft"; N E X T 1
14-5 FOR i =1 TO 20: PRINT RT i .0
, ’‘ft": P R INT RT i .31.; "ft";' N E X T i
150 PRINT RT 2 0 ,9 .;"© p.r. Gat&bl
155 PRINT RT 4-, 10, PA P E R 5; INK
l ; " R E PERTORY"
156 PRINT RT 5.10; P R P E R 5j INK
1 ; "GRID
"
15? PRI N T RT 6,10; P A P E R 5; I N K
1;"A N A L Y S I S "
160 P R INT RT 9,5; P R P E R 5; I N K
1.: Eie.Kt.ent. r a n k i n g a&thftd” ' .. ....
I M P R I N T RT 12,2; INK 6 ; "RTt
‘
Bannijtei & ‘Fra n s e l l a "
165 P A U S E 120
^1?0 B O R D E R 7: PRP E R 7; INK ©: C
175 PRINT INUER5E 1; " In’tfOdUCti;
on"' '
ISO PRINT "This p r o g r a m wilt re
late U P t o
15 eleme n t s against-.?
each of up
to 10 constructs. " P :
T^?u.posi tion of e a c ^ el e m e n t on
each construct is e n t e r e d first
:
T h e s e are then r e o r g a n i s e d
1 f?
,ar>K.s and disp l a y e d a n e w . "
165 PRINT '"Spearma n ' s rho is t
hen computed for the carrs-irrtrcl matrix as is a re lationship s core
based on the square of the corre
la ti.on * 1 8 0 . " ' '"The construct m
ap is then drawn."'* ”De ison s t r a t i
on data is avail a b l e in the prog
ram."
190 PRINT PRP E R 6 ; "Press any Re
y to continue . . „
pause's
200 REM ftftftftftftftftiHftftftftftftHe-*--*-*-^*-*.
210 REM
tConstants/Di»ensionsf
215 REN ftftftftftftftftftftftftftftftftftftftftftft
220 DIM e (15,10);
RE M e l e m e n t s
225 DIM C ( 1 5 ) ; REM T otal el sc r
230 DIM 1(15,10); REM transpose
235 DIM d (10,15): R E M div'd els
24-0 DIM C $ (10,20): REM
construct names
215 DIM r (10,10): REM ran* corr
250 DIM s (10,10) : REM ret s c o r e
255 DIM t (10) ; REM S U M O f S C O re
260 DIM m$(7,2?)
270 DIN e j (15,20) : REM el names
300 let mjiii) = "Press any Key to
continue.
310 LET M $ (2) ="
Do you want it
printed? "
320 LET »$(S)="
Ar e t h e r e a n y
co r r e c t i o n s ? "
330 LET m$(4)="
34-0
350
36©
390

LET
(5)- “CO N S T R U C T S "
LET m $( 6 ) = “ELEM E N T S "
LET m i l ? ) = “R ANK I N G S "
LET t $
ONSTRUCT

4-00

DLi

100

P.R. Gamble

‘N

I* 1 X 5

INI

es® let

”

655
650
670
600
690
700
) .;a s»
XH?
715

MR

£ =r

4 ) . -let f s = r s +

IHR
s; INK 1; "New *
740 G o / S U B 660; GO T O 700
©00 P R I N T RT ift3,0;

ill -r 1 '* 1m TBliiMiwXNT T W R - 1 r
©2 © R E T U R N

l

X®©®

ftftftftftftft--e--f-ft-s-ft-i-ft.

m a t riilxl vj*l
4010 R E M *.
ftftEnter
tftftftftftffirst
tfttftftft*.^
102© B O R D E R 4; PRPER s ; INK 0; C-

J0?? thl S$ ="

I construct.

"

e?I*er

bright

EOR
P i®
®

INK

1 =1 T O

thi

for

i;s$

con
SX 3 -0; E E R 5 H l;
7.; "Construct "; i ;

Pape
f l a s h

J=1 TO « *■

l'nl-

1062 IF e (J ,i ) >e l T H E N B E E P .2,1063 IF e (j ,i ) >eI T H E N GO T O 106

iSSS ^

t;< f t l U O + , 6 ) X

r

L E T cS=rgsCl TO 32)
CLS,
PRIffT R T 0,S;
F O R ie l ’T O COD
INPUT ( " N O i ;“? " ; ) : c $ C i )
GO S U B 8 BG
‘
NE X T i
I N P U T P A P E R 7; INK I; C»«( 3 )
XE a»C>".y" T H E N GO T Q I S 2 Q
L E T i =0 ..

1090
1100
111©
Ha®
1 lc’5

Tj RT

B E E P .2.32, BE E P
1 *=; oo
NEXT i '
-15,22
FOR i =0 T O 3
N E X T T .f,T ‘
LET s$-~o>$(7)
Gu SUE- 902©

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1130 PRINT "AT 21.2;" (Matrix con-" 
1135 lists of elements.)
1136 PRINT AT 0.0;" PAPER 2; INK 7;" \ + (16);" 1;" NEXT i
1140 IF a(x);="y" AND a(y);="y" THEN
1145 IF CON<5 THEN GO TO 1260
1150 PRINT AT 1260
1155 INPUT PAPER 6; INK 0;" Which construct is it?"" \ + (16);" 1;" NEXT i
1160 IF CON<5 THEN GO TO 1260
1165 INPUT PAPER 6; INK 0;" a
1170 IF CON<5 THEN GO TO 1155
1175 INPUT PAPER 5;" Enter the ne-" \ + (16);" 1;" NEXT i
1180 IF CON<5 THEN GO TO 1155
1185 LET CON=CON+1: IF CON<5 THEN LET CON=CON+1
1190 LET CON=CON+1: IF CON<5 THEN LET CON=CON+1
1195 LET CON=CON+1: IF CON<5 THEN LET CON=CON+1
1200 PRINT AT 6;" Matrix consists of" \ + (16);" 1;" NEXT i
1205 PRINT AT 11;" Matrix consists of" \ + (16);" 1;" NEXT i
1210 PRINT AT 16;" Matrix consists of" \ + (16);" 1;" NEXT i
1215 PRINT AT 21;" (Matrix con-" \ + (16);" 1;" NEXT i
1220 PRINT AT 26;" DRAW 0,149: GO" \ + (16);" 1;" NEXT i
1225 PRINT AT 31;" DRAW 0,149: GO" \ + (16);" 1;" NEXT i
1230 PRINT AT 36;" DRAW 0,149: GO" \ + (16);" 1;" NEXT i
1235 PRINT AT 41;" DRAW 0,149: GO" \ + (16);" 1;" NEXT i
1240 PRINT AT 46;" DRAW 0,149: GO" \ + (16);" 1;" NEXT i
1245 PRINT AT 51;" DRAW 0,149: GO" \ + (16);" 1;" NEXT i
1250 PRINT AT 56;" DRAW 0,149: GO" \ + (16);" 1;" NEXT i
1255 PRINT AT 61;" DRAW 0,149: GO" \ + (16);" 1;" NEXT i
1260 PRINT AT 66;" DRAW 0,149: GO" \ + (16);" 1;" NEXT i
1265 PRINT AT 71;" DRAW 0,149: GO" \ + (16);" 1;" NEXT i
1270 PRINT AT 76;" DRAW 0,149: GO" \ + (16);" 1;" NEXT i
1275 PRINT AT 81;" DRAW 0,149: GO" \ + (16);" 1;" NEXT i
1280 PRINT AT 86;" DRAW 0,149: GO" \ + (16);" 1;" NEXT i
1285 PRINT AT 91;" DRAW 0,149: GO" \ + (16);" 1;" NEXT i
1290 PRINT AT 96;" DRAW 0,149: GO" \ + (16);" 1;" NEXT i
1295 PRINT AT 101;" DRAW 0,149: GO" \ + (16);" 1;" NEXT i
1300 PRINT AT 106;" DRAW 0,149: GO" \ + (16);" 1;" NEXT i
1305 PRINT AT 111;" DRAW 0,149: GO" \ + (16);" 1;" NEXT i
1310 PRINT AT 116;" DRAW 0,149: GO" \ + (16);" 1;" NEXT i
1315 PRINT AT 121;" DRAW 0,149: GO" \ + (16);" 1;" NEXT i
1320 EXIT
1325 EXIT
1330 END
1335 END
Appendix 1

P. R. Gamble

Page 574
9000 REM ****************************
9005 REM  * Utilities
9010 REM ****************************
9020 PRINT AT 0,10; PAPER 2; INK
7;"CONSTRUCTS"
9030 FOR i=1 TO 9
9040 PRINT AT 5+i,0; PAPER 2; INK 7;"$"(i)
9050 NEXT i
9050 PLOT 25,10; DRAW 0,140; DRA
U 220,8
9070 FOR i=1 TO 9
9075 LET a$=STR$(i); IF LEN a$<
2 THEN LET a$=""+a$
9080 PRINT AT 4+i,1; PAPER 5;a$
9085 NEXT i
9090 FOR i=1 TO 9
9095 IF i=10 THEN LET bit=0
9100 PRINT AT 2,(i$tab)+bit; PAP
ER 5;i
9105 NEXT i
9110 RETURN
9110 INPUT AT 0,0; PAPER 3; tab(2)
);a$
9140 IF a$=""y" THEN COPY
9150 RETURN
9990 DEF FN z(z$)=VAL ("PEEK "+z
$+"+256+PEEK ("+256+"+1")") ; PRINT
"Free",FN z("23730")-FN z("2364
1")"Variables",FN z("2364
1")-FN z("23627")-06N"
Listing of Cluster Analysis Program (CAP)
Written in Microsoft BASICA for an IBM PC AT

100 ' cluster analysis program
110 ' After an algorithm published by Rob Spencer
120 ' P.R. GAMBLE Version
130 ' Date: 01.02.85 (CPM)
140 ' Date: 29.12.85 (MS-DOS)
147 ' Current version 22.02.86
150 ')
160 DEFINT A-C,I-N
170 DIM X(30,30),W(30),XS(30),XM(30),X2(30)
180 DIM B(30),B2(30),A(30),NN(30)
190 DIM PX(30),PY(30),Y2(15,15)
200 DIM T(15,15),C$(15),E$(15),DZ(15), BASE(15)
203 KEY OFF
204 LPRINT Chr$(27) + "O": ' Initialise NLQ printing
205 ULOFF$ = Chr$(27) + "-1": ULOFF$ = Chr$(27) + "-0"
210 GOSUB 2400: ' Pick up on data entry or read routine
220 GOSUB 290: GOSUB 2120: GOSUB 290
225 SCREEN 0: CLS
230 PRINT:PRINT "** End of Program **":PRINT:PRINT:PRINT
240 INPUT "Do you want another run ";A$
250 IF A$ <> "Y" AND A$ <> "y" THEN 270
260 GOTO 210
270 CLS
275 LPRINT Chr$(27) + "H": ' Turn off NLQ printing
280 SCREEN 0:0:0; KEY ON; END
290 FOR I = 1 TO 15: XM(I) = 0: XS(I) = 0: DZ(I) = 0: BASE(I) = 0: NEXT
293 COUNT = 1
300 SCREEN 0:COLOR 14,6:CLS; PRINT MESSAGE$
310 FOR I = 1 TO LEN(MESSAGE$): PRINT ";": NEXT: PRINT CHR$(7)
320 ' read data, do sums of squares
330 ')
340 ')
350 FOR I=1 TO NEL
360 W(I)=I
370 FOR K=1 TO NCON
380 XM(K)=XM(K)+X(I,K)
390 X2(K)=X2(K)+X(I,K)^2
400 NEXT K
410 NEXT I
420 ' do means and standard deviations
430 ')
440 ')
450 FOR K=1 TO NCON
455 IF XM(K) = NEL THEN 470
460 XS(K)=SDR((X2(K)-(XM(K))^2/VEL)/(VEL-1))
470 XM(K)=XM(K)/VEL
477 IF XS(K) < .0001 THEN LPRINT "Construct "; BASE$(7)
478 IF XS(K) < .0001 THEN LPRINT CHR$(7)
479 IF XS(K) < .0001 THEN XS(K) = 1
480 NEXT K
490 ')

P.R. Gamble
500 'convert data to normal form
510 '  
520 FOR I=1 TO NEL 
530 FOR K=1 TO NCON ;  X(I,K)=(X(I,K)-XM(K))/XS(K) : NEXT K 
540 NEXT I 
550 '  
560 ' Build linked list 
570 '  
580 SCREEN 0,0,0: COLOR 4,15: CLS 
590 PRINT TITLE$,  DATER$ 
600 PRINT "Distance  Node" 
610 PRINT "==================================" 
620 NO=NEL :  NC=NEL 
630 DMIN=1000000! 
640 '  find the closest pair of nodes 
650 FOR JP=2 TO NC 
660 FOR IP=1 TO JP-1 
670 D=0 
680 FOR K=1 TO NOON :  D=D+(X(IP,K)-X<JP,K)*X(IP,K)-X(JP,K)) :  NEXT K 
690 IF D<DMIN THEN DMIN=D :  I=IP :  J=JP 
700 NEXT IP 
710 NEXT JP 'nodes i and j are closest 
720 NEL=NEL+1 'combine i and j, add to the bottom of the list 
730 FOR K=1 TO NCON 
740 X<NEL,K)s(W(I)*Xa,K>+W(J)*X<J,K>)/(W<I)+W(J>) 
750 NEXT K 
760 W(NEL)=W(I)+W(J) 
770 NN$(NEL)="("+NN$(I )","+NN$(J)+")" 
780 '  swap the new node into list, old i and j out 
790 FOR K=1 TO NCON 
800 SWAP X(I,K),X(NEL,K) 
810 SWAP X(J,K),X(NC,K) 
820 NEXT K 
830 '  swap the new node into list, old i and j out 
840 FOR K=1 TO NCON 
850 SWAP X(I,K),X(NEL,K) 
860 SWAP X(J,K),X(NC,K) 
870 NEXT K 
880 SWAP B1(I),B1(NEL) :  SWAP B1(J),B1(NC) 
890 SWAP B2(I),B2(NEL) :  SWAP B2(J),B2(NC) 
900 SWAP W(I),W(NEL) :  SWAP W(J),W(NC) 
910 SWAP NN$(I),NN$(NEL) :  SWAP NN$(J),NN$(NC) 
920 B1(I)=NC :  B2(I)=NEL 
930 '  
940 DZ(COUNT) = DMIN: COUNT = COUNT + 1 
950 PRINT USING "###.#### ";DMIN, 
960 SIZE = LEN(NN$(I)) 
970 IF SIZE <= 65 THEN PRINT NN$(I) 
980 IF SIZE <= 65 THEN 1080 
990 PRINT LEFT$(NN$(I),65); PRINT TAB(13); 
1000 IF SIZE <= 130 THEN PRINT MID$(NN$(I),66) ELSE PRINT 
1010 MID$(NN$(I),66,65) 
1020 IF SIZE <= 130 THEN 1080 
1030 PRINT TAB(13); . 
1040 IF SIZE <= 195 THEN PRINT MID$(NN$(I),131) ELSE PRINT 
1050 MID$(NN$(I),131,65) 
1060 IF SIZE <= 195 THEN 1080 
1070 PRINT TAB(13);
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1052 IF SIZE <= 260 THEN PRINT MID$(NN$(I),196) ELSE PRINT MID$(NN$(I),196,65)
1054 IF SIZE <= 260 THEN 1080
1056 PRINT TAB(13);PRINT MID$(NN$(I),261)
1060 ' count down, if not done, find the
1070 ' next closest pair of nodes
1080 NC=NC-1
1090 IF NC>1 THEN GOTO 660
1100 ' set the A pointers by recursion
1120 ' 1130 CP=1 : GOSUB 1510
1140 ' print the linked list
1160 ' build dendrogram
1255 GOSUB 5000
1256 LOCATE 1,1,0: ' tuck cursor out of way
1257 WHILE INKEY$ = "": WEND
1258 GOSUB 4800
1260 COLOR 11,1,2:CLS:LOCATE 1,30:PRINT "+++ Building Dendrogram +++"
1270 Y = -1
1280 CP = 1: GOSUB 1570
1290 CP = 1: GOSUB 1650
1300 ' recursive routines
1320 ' 1330 DEF FNPX(I) = 550 * PX(I)/PX(1) + 60 ' machine specific functions
1340 DEF FNPY(I) = 190 - 190 * PY(I)/NO
1350 PX(0) = 1.05 * PX(1)
1360 CLS : SCREEN 2,,0,0
1370 CP = 1: GOSUB 1760 ' insert the - and |
1380 ' Keep picture then clear screen here if screen output
1390 ' 1410 CP = 1: GOSUB 1770 ' set co-ordinates by recursion
1420 ' 1430 LOCATE 25,10: PRINT TITLE$;
1440 LOCATE 1,1,0 ' put cursor out of way
1442 WHILE INKEY$ = "": WEND
1445 RETURN
1450 ' recursive routines
1460 ' set upwards pointers A(I)
1500 ' 1510 IF B1(CP)>0 THEN A(B1(CP))=CP : CP=B1(CP) : GOSUB 1510 : CP=A(CP)
1520 IF B2(CP)>0 THEN A(B2(CP))=CP : CP=B2(CP) : GOSUB 1510 : CP=A(CP)
1530 RETURN
1540 ' set Y co-ords of simple nodes
1560 ' 1570 IF B1(CP) > 0 THEN CP = B1(CP): GOSUB 1570 : CP=A(CP)
1580 IF B2(CP) > 0 THEN CP = B2(CP): GOSUB 1570 : CP=A(CP)
1590 IF B1(CP) > 0 THEN RETURN
1600 Y = Y + 1: PY(CP) = Y: PX(CP) = 0
1610  RETURN
1620 ,
1630  set X and Y co-ords of other nodes
1640 ,
1650  IF B1(CP) > 0 THEN CP = B1(CP): GOSUB 1650 : CP=A(CP)
1660  IF B2(CP) > 0 THEN CP = B2(CP): GOSUB 1650 : CP=A(CP)
1670  IF B2(CP) = 0 THEN RETURN
1680  D = 0: I = B1(CP); J = B2(CP)
1690  FOR K = 1 TO NCON: D = D + (X(I,K) - X(J,K))^2: NEXT K
1700  PY(CP) = (W(B1(CP)) * PY(B1(CP)) + W(B2(CP)) * PY(B2(CP)) / 
        (W(B1(CP)) + W(B2(CP))))
1710  PX(CP) = SQR(D)
1720  RETURN
1730 ,
1740  draw dendrogram
1750 ,
1760  IF B1(CP) > 0 THEN CP = B1(CP): GOSUB 1760 : CP=A(CP)
1770  IF B2(CP) > 0 THEN CP = B2(CP): GOSUB 1760 : CP=A(CP)
1780 ,
1790  LINE(FNPX(CP), FNPY(BKCP) ) - (FNPX(CP),FNPY(B£(CP) )
1800  LINE(FNPX(CP), FNPY(CP)) - (FNPX(A(CP)>,FNPY(CP))
1810  IF B1(CP) > 0 THEN RETURN
1820  LOCATE FNPY(CP)/8,1
1830  PRINT NN$(CP);
1840  RETURN
2090 ,------------------------------------------------------------
2100  Turn array round to do constructs
2110 ,-----------------------------------------------------------------------------
2120  FOR I = 0 TO NEL: NN$(I) = NEXT: NEL = ONEL
2150  MESSAGE* = "Searching for CONSTRUCT clusters"
2160  FOR I = 1 TO NCON
2170    FOR K = 1 TO NEL
2180      Y2(I,K) = T(K,I)
2190    NEXT
2200  NEXT
2210  SWAP NCON,NEL
2220  NN* = 2 * NEL
2230  FOR I = 1 TO NEL
2240    FOR K = 1 TO NCON
2250      X(I,K) = Y2(I,K)
2260  NEXT
2270  NEXT
2280  FOR I = 1 TO NEL
2290    NN$(I) = C$(I)
2300  NEXT
2310  FOR I = 1 TO 30
2320    B1(I) = 0:B2(I) = 0:A(I) = 0:W(I) = 0: X2(I) = 0
2330  NEXT
2340  RETURN
2350 ,
2360 ,------------------------------------------------------------
2370  Main Entry Routine: Record or Retrieve Data
2380 ,-----------------------------------------------------------------------------
2390 ,
2400  FOR I = 1 TO 15: FOR J = 1 TO 15: T(I,J) = 0: NEXT : NEXT
2410 MESSAGE$ = "Searching for ELEMENT clusters"
2420 FOR I = 1 TO 15: E$(I) = "": C$ (I) = "": NEXT
2430 REM ** Enter Data**
2460 REM ** Enter Data**
2470 SCREEN 0,0,0: COLOR 14,6,0: CLS: ' Clear screen
2480 N = 25
2490 PRINT TAB(N); "ftftftftftftftftftftftftftftftftftftftftftftftttftft#*"
2500 PRINT TAB(N);  "ft Cluster Analysis Program ft"
2510 PRINT TAB(N); "ft ft"
2520 PRINT TAB(N);  "ft C A P ft"
2530 PRINT TAB(N);  "ft ft"
2540 PRINT TAB(N); "ft <c> P.R. Gamble 1985 ft"
2550 PRINT TAB(N); "ftftft*ftftft*ftftftftftftftftftftftftftft*ftftftftft"　
2560 FOR I = 1 TO 10: PRINT: NEXT
2562 FOR 1 = 1 TO 15: XM(I) = 0: XS(I) = 0: NEXT
2564 FOR I = 1 TO 30
2566 B(I) = 0: B2(I) = 0: A(I) = 0: W(I) = 0: X2(I) = 0
2568 NEXT
2570 PRINT "<Press any key to begin>";
2580 A$ = INKEY$: IF A$ = "" THEN 2580
2590 CLS
2600 INPUT "Are your data already on file ";A$
2610 IF A$ <> "Y" AND A$ <> "y" THEN 2800
Appendix 2

2870 PRINT CHR$(7); "Sorry, must be MORE THAN 2 and 15 OR LESS."
2880 PRINT: GOTO 2840
2890 INPUT ". . . and how many constructs "; NCON
2900 IF NCON >= 2 AND NCON <= 15 THEN 2930
2910 PRINT CHR$(7); "Sorry, must be MORE THAN 2 and 15 OR LESS."
2920 PRINT: GOTO 2890
2930 PRINT "; INPUT "What rating scale are you using"; R: PRINT
2940 PRINT "Could you please enter a title for your grid."
2950 INPUT TITLE$
2960 TITLE$ = TITLE$ + PAD$
2970 IF LEN(TITLE$) > 22 THEN TITLE$ = LEFT$(TITLE$,22)
2980 PRINT "Title = "; TITLE$
2990 INPUT "Finally, please record a reference date "; DATER$
3000 IF LEN(DATER$) >= 1 THEN 3020
3005 DATER$ = DATES
3007 TEMPS = LEFT$(DATER$, 2): MIDS(DATER$, 4, 2) = MIDS(DATER$, 4, 2)
3008 DATER$ = DATER$ + PAD$
3009 IF LEN(DATER$) > 10 THEN DATER$ = LEFT$(DATER$, 10)
3010 PRINT "Date = "; DATER$
3012 PRINT: PRINT: PRINT
3013 PRINT "Is everything O.K. Do you wish to proceed "; AS$
3014 IF AS <> "Y" AND AS <> "y" THEN 2800
3017 ' Enter data values
3018
3019 FOR I = 1 TO NEL
3020 CLS: PRINT USING "Entering element ##"; I
3021 PRINT "-------------------": PRINT
3022 FOR K = 1 TO NCON
3023 PRINT USING "Element Construct ## "; I, K;
3024 PRINT USING "Value = "; T(I, K)
3025 NEXT K
3026 NEXT I
3027 CLS
3028 PRINT: PRINT: PRINT
3029 FOR I = 1 TO NEL
3030 PRINT "What is the name of element ## "; I;
3031 INPUT E$(I)
3032 E$(I) = E$(I) + PAD$
3033 E$(I) = LEFT$(E$(I), 9)
3034 NEXT I
3035 CLS
3036 PRINT: PRINT
3037 FOR I = 1 TO NEL
3038 PRINT USING "##) "; I;
3039 PRINT E$(I)
3040 NEXT I
3041 PRINT: INPUT " Do you want to correct any of these ELEMENT names "; AS$
3042 IF AS <> "Y" AND AS <> "y" THEN 3390
3043 PRINT: PRINT "Which element is it "; I
3044 IF I < 1 OR I > NEL THEN 3340
3045 PRINT: INPUT "Please enter the new element name "; E$(I)
Computers and Innovation in the Hospitality Industry

```
3370 E$(I) = E$(I) + PAD$: E$(I) = LEFT$(E$(I),9)
3380 GOTO 3270
3390 CLS
3395 GOSUB 5000
3400 PRINT "Please enter the construct names now."
3410 PRINT "------------------------------------":PRINT:PRINT
3420 FOR I = 1 TO NCON
3430 PRINT USING "What is the name of construct #";I;
3440 INPUT C$(I)
3450 C$(I) = C$(I) + PAD$
3460 C$(I) = LEFT$(C$(I),9)
3470 NEXT
3480 CLS
3490 FOR I = 1 TO NCON
3500 PRINT USING "##);";I;
3510 PRINT C$(I)
3520 NEXT
3530 PRINT:INPUT "Do you want to correct any of these CONSTRUCT names ";A$
3540 IF A$ <> "Y" AND A$ <> "y" THEN 3600
3550 PRINT:INPUT "Which construct is it ";I
3560 IF I < 1 OR I > NCON THEN 3550
3570 INPUT "Please enter the new construct name ";C$(I)
3580 C$(I) = C$(I) + PAD$: C$(I) = LEFT$(C$(I),9)
3590 GOTO 3480
3600 GOSUB 3980
3610 PRINT:INPUT "Do you want to correct any of these data values ";A$
3620 IF A$ <> "Y" AND A$ <> "y" THEN 3690
3630 PRINT:INPUT "Which element is it ";I
3640 IF I < 1 OR I > NEL THEN 3630
3650 PRINT:INPUT ".and which construct is it ";K
3660 IF K < 1 OR K > NCON THEN 3650
3670 PRINT:INPUT "What is the new data value ";T(I,K)
3680 GOTO 3600
3690 CLS
3700 INPUT "Do you want the grid printed ";A$
3710 IF A$ <> "Y" AND A$ <> "y" THEN 3740
3720 GOSUB 4080
3730 PRINT:PRINT
3740 INPUT "Do you want to file the grid data ";A$
3750 IF A$ <> "Y" AND A$ <> "y" THEN RETURN
3760 INPUT "Give me a name for the file (up to 8 characters)");FILE$
3765 FOR I = 1 TO LEN(FILE$)
3766 TEMP$ = MID$(FILE$,I,1): IF ASC(TEMP$) < 96 THEN 3769
3767 TEMP$ = CHR$(ASC(TEMP$) - 32)
3768 MID$(FILE$,I,1) = TEMP$
3769 NEXT I
3770 FILE$ = FILE$ + PAD$: FILE$ = LEFT$(FILE$,8)
3780 FILE$ = FILE$ + ".GRD"
3790 GOSUB 4370
3800 PRINT: PRINT "** File ";FILE$; " ** has been created."
3805 FOR I = 1 TO 1000: NEXT
3810 FOR I = 1 TO NEL
3820 FOR K = 1 TO NCON
3830 X(I,K) = T(I,K)
3840 NEXT K
```

P.R. Gamble

Page 584
3850 NEXT I
3860 FOR I = 1 TO NEL: NN$(I) = E$(I): NEXT
3870 NM = 2 * NEL: CLS
3880 RETURN
3890 ' Display entries for checking
3910 '
3920 CLS
3930 PRINT "ELEMENTS CONSTRUCT SCORES"
3940 PRINT "-------------------------------"
3950 PRINT TAB(5); "ELEMENTS CONSTRUCT SCORES"
3960 FOR I = 1 TO NEL: Print USING " <##>«: NEXT: PRINT
3970 FOR I = 1 TO NEL
3980 PRINT USING "##> «;I;:
3990 FOR K = 1 TO NCON
4000 PRINT USING " ### U;T(I,K);"
4010 NEXT K
4020 NEXT I
4030 RETURN
4040 '
4050 ' ******************************************************
4060 ' Print data table
4065 ' ******************************************************
4070 ' 4080 LPRINT CHR$(18); CHR$(14); ULON$; TITLE$;ULOFF$; " "; UON$;"Date:"
4090 LPRINT ;;DATE$;ULOFF$
4100 LPRINT CHR$(20); LPRINT
4110 LPRINT NEL;" Elements ";NCON;" Constructs ";"1 to ";R;" Rating scale"
4120 LPRINT
4130 IF NCON <= 10 THEN 4140
4135 WIDTH "LPT1": 132: LPRINT CHR$(15)
4140 LPRINT ULON$; "ELEMENTS CONSTRUCT SCORES";ULOFF$
4150 LPRINT TAB(17);
4160 FOR I = 1 TO NCON: LPRINT USING " <##>«;I;: NEXT: LPRINT
4170 FOR I = 1 TO NEL
4180 LPRINT USING "##> «;I;:LPRINT E$(I); " ";
4190 FOR K = 1 TO NCON
4200 LPRINT USING " ### U;T(I,K);"
4210 NEXT K
4220 NEXT I
4230 LPRINT
4240 NEXT I
4250 LPRINT CHR$(18)
4255 WIDTH "LPT1": 80
4260 LPRINT ULON$; "Construct names";ULOFF$
4270 FOR I = 1 TO NCON
4280 LPRINT C$(I)
4290 LPRINT
4300 NEXT
4310 IF NCON > 10 THEN LPRINT CHR$(18)
4320 LPRINT CHR$(12)
4330 RETURN
4340 REM ******************************************************
4350 REM * Write data to a sequential file *
4360 REM ******************************************************
4370 OPEN "O", #1, FILE$  
4380 WRITE #1, NEL, NCON, R  
4390 FOR I = 1 TO NEL  
4400 FOR K = 1 TO NCON  
4410 WRITE #1, T(I, K)  
4420 NEXT K  
4430 NEXT I  
4440 FOR I = 1 TO NEL  
4450 WRITE #1, E$(I)  
4460 NEXT  
4470 FOR I = 1 TO NCON  
4480 WRITE #1, C$(I)  
4490 NEXT  
4500 WRITE #1, TITLES  
4510 WRITE #1, DATERS  
4520 CLOSE 1  
4530 RETURN  
4540 REM ****************************  
4550 REM * Read (input) from the file *  
4560 REM ****************************  
4570 OPEN "I", #1, FILE$  
4580 IF EOF(1) GOTO 4740  
4590 INPUT #1, NEL, NCON, R  
4600 FOR I = 1 TO NEL  
4610 FOR K = 1 TO NCON  
4620 INPUT #1, T(I, K)  
4630 NEXT K  
4640 NEXT I  
4650 FOR I = 1 TO NEL  
4660 INPUT #1, E$(I)  
4670 NEXT  
4680 FOR I = 1 TO NCON  
4690 INPUT #1, C$(I)  
4700 NEXT  
4710 INPUT #1, TITLES  
4720 INPUT #1, DATERS  
4730 CLOSE 1  
4740 PRINT " ** End of data file read. **":PRINT  
4750 ONEL = NEL  
4760 RETURN  
4770 '  
4780 ' Offer relative node printing  
4790 '  
4800 LOCATE 25, 1  
4805 GOSUB 5000  
4810 INPUT "Do you want the relative nodes to be printed "; A$  
4820 IF A$ <> "Y" AND A$ <> "y" THEN RETURN  
4825 LPRINT  
4830 TOP = DZ(COUNT - 1)  
4832 FOR I = 1 TO COUNT - 1  
4834 BASE (I) = INT(((DZ(I) / TOP) * 100) + .5)  
4836 NEXT I  
4840 LPRINT ULONG$; "Node"; ULOFF$,  
4850 LPRINT ULONG$; "Value "; ULOFF$,  
4860 LPRINT ULONG$; "Relative Value"; ULOFF$
4870 FOR I = 1 TO COUNT - 1
4880 LPRINT USING "## I?"
4890 LPRINT USING "###.##"; DZ(I)
4900 LPRINT USING "###.##"; BASE(I)
4910 NEXT
4915 LPRINT CHR$(13)
4920 RETURN
4950 ' SIlly Noise
4960 ' Silly Noise
5000 FOR I = 500 TO 800 STEP 50
5010 SOUND I, .5
5020 NEXT
5030 FOR I = 800 TO 500 STEP -50
5040 SOUND I, .5
5050 NEXT
5060 RETURN

Sample Output from CAP

Pro-forma
Files
Checklist
Phone
Calc'Itr
Comp. Rep.
Telex
Computer
Aide Mem.
Committee
Ref Table
Text Book

P.R. Gamble
Listing of the MONOCLE Clustering Program
Written in SUPERBASIC for the Sinclair QL Computer

100 REMark *******************************
110 REMark # Cluster Analysis Program *
120 REMark # (After M.L.G. Shaw) *
130 REMark * Copyright P.R. Gamble *
140 REMark # V2. 08.12.84 *
150 REMark *******************************
160 CLEAR
170 PAPER #2, 0: CLS#2: MODE B
180 CSIZE 3,1
190 screen
200 INK 6: FILL 1
210 CIRCLE 30,57,6:FILL 0: FILL 1: CIRCLE 48,57,6: FILL 1
220 INK 3
230 CIRCLE 31,58,3:FILL 0: FILL 1: CIRCLE 49,58,3
240 INK 5
250 AT 5,4: PRINT "M";AT 5,6;AT 5,8: PRINT "N"
260 AT 5,12:PRINT "CLE"
270 FILL 0
280 INK 4,6: UNDER 1
290 AT 10,4;CSIZE 0,0;PRINT CHR$(127);" P.R. Gamble"; UNDER 0
300 a# = INKEY*(-1): noise :CLS
310 CLEAR
320 pad* = ""
330 start_up
340 conmatch% = -200: elmatch% = -100: century% = 100: done% = 0
350 z0$ = CHR$(14):zl$ = CHR$(20): REMark Large print mode on/off
360 z2$ = CHR$(15):z3$ = CHR$(18): REMark Condensed printing on/off
370 CLS
380 OPEN #5, ser1: BAUD#5, 1200: dev = 5: dv = 5: WIDTH#5, 132
390 IF con% > 14 OR el% > 14 THEN PRINT#dev, z2$
400 PRINT#dev,CHR$(27) & CHR$(45):z0$;"MONOCLE";zl$;CHR$(27) & CHR$(45)
410 PRINT#dev
420 PRINT#dev, z0$;"Raw Grid Data";zl$
430 PRINT#dev, gridname$; PRINT#dev
440 PRINT#dev, con% "Constructs",el% "Elements","Scale 1 to"! rate%
450 FOR i = 1 TO 50:PRINT#dev,"-";END FOR i: PRINT#dev
460 FOR i = 1 TO con%
470 IF i < 10 THEN PRINT#dev," ";
480 PRINT#dev, i;""
490 FOR j = 1 TO el%
500 PRINT#dev, grid%(i,j)" ";
510 END FOR j
520 PRINT#dev
530 END FOR i
540 PRINT#dev,"Construct names":PRINT#dev,"------
550 FOR i = 1 TO con%
560 PRINT#dev, con_name$(i)
570 END FOR i
580 PRINT#dev,"Element names":PRINT#dev,"------
590 FOR i = 1 TO el%
600 PRINT#dev, el_name$(i)
610 END FOR i

P.R. Gamble
MONOCLE
620 size% = con%
630 IF el > size%
640 size% = el%
650 END IF
660 DIM gridmap(con%, con%); DIM copy_gridmap(size%, size%)
670 DIM rflag%(size%); DIM cflag%(size%)
680 DIM erflag%(el%); DIM ecflag%(el%)
690 DIM r%(size%); DIM c%(size%); REMark ** Parameters of Construct Tree **
700 DIM er%(el%); DIM ec%(el%)
710 DIM revers%(con%, el%); DIM revmap(con%, con%)
720 DIM score%(con%, con%); DIM el_score%(el%, el%)
730 DIM level(size% + 2); DIM clevel(size% + 2)
740 DIM rev_score%(con%, con%); DIM elmap(el%, el%)
750 list$ = "": con_list$ = "": el_list$ = ""
760 eldata = 0
770 INK 2; CSIZE 3,1
780 CLS: AT 5,1: PRINT "Generating Grid Analysis"
790 CSIZE 1,0; INK 7
800 AT 12,14;: PRINT "Computing construct scores.": noise
810 reverse
820 con_score
830 PRINT#dev
840 con_mapping
850 PRINT#dev
860 AT 12,12;:CLS 3
870 AT 12,14; PRINT "Printing construct scores.": noise
880 gridprint
890 con_tree
900 con_order: PRINT#dev
910 con_reverse: PRINT#dev; PRINT#dev
920 GO TO 980
930 PRINT#dev, list$: PRINT#dev
940 PRINT#dev: PRINT#dev,"Highest matches"
950 FOR i = 1 TO con% - 1
960 PRINT#dev, i" = "; r%(i), c%(i)!" at"!copy_gridmap(r%(i), c%(i))
970 END FOR i: PRINT#dev
980 tree_describe: PRINT#dev
990 AT 12,12;:CLS 3
1000 AT 12,14; PRINT "Computing element scores.": noise
1010 el_score
1020 el_mapping
1030 AT 12,12;:CLS 3
1040 AT 12,14; PRINT "Printing element scores.": noise
1050 elprint
1060 el_tree
1070 con_list$ = list$: list$ = ""
1080 AT 12,12;:CLS 3
1090 AT 12,14; PRINT "Transferring data for element tree.": noise
1100 elmave
1110 con_order: PRINT#dev
1120 GO TO 1170
1130 PRINT#dev, list$: PRINT#dev
1140 FOR i = 1 TO el% - 1
1150 PRINT#dev, i" = "; er%(i), ec%(i)!" at"!elmap(er%(i), ec%(i))
1160 END FOR i
1170 PRINT#dev
1180 AT 12,12:; CLS 3
1190 AT 12,14:;PRINT "Describing element tree.": noise
1200 tree_describe
1210 AT 12,12:; CLS 3
1220 AT 12,14:;PRINT "Printing analysed grid.": noise
1230 gridout
1240 ending
1250 STOP
1260 REMark **************
1270 REMark * Small sound *
1280 REMark **************
1290 DEFine PROCedure noise
1300 BEEP 3600,5,15,720,5,5
1310 END DEFine
1320 REMark ***********************
1330 REMark * Main routines to create and read data files *
1340 REMark ***********************
1350 DEFine PROCedure start_up
1360 screen: scl: CLS
1370 INK 5
1380 AT 5,5:;INPUT "Is your data on file ?"! temp*
1390 IF LEN(temp*) < 1 THEN GO TO 1480
1400 IF temp*(1) <> "y" THEN GO TO 1480
1410 long = 8: n* = "File": flag = 1
1420 namer
1430 screen: CSIZE 3,1: INK 5: PAPER 0: CLS
1440 AT 5,2:; PRINT "Reading data file "; gridname*
1450 reader
1460 screen: scl: CSIZE 0,0
1470 RETurn
1480 long = 20: n* = "Grid"
1490 flag = 0: namer
1500 INK 7: PAPER 0: CLS
1510 AT 0,0: CSIZE 1,0
1520 INPUT "How many constructs do you have (less than 18) ? ";con%
1530 IF con% > 17 THEN GOTO 1580
1540 CLS: PRINT "Sorry, must be less than 18."
1550 BEEP 5000,200
1560 FOR i = 1 TO 1000: END FOR i
1570 CLS: GO TO 1510
1580 END IF
1590 AT 4,0
1600 INPUT ". and elements (also less than 18) ? ";el%
1610 IF el% > 17 THEN GOTO 1680
1620 CLS 3: PRINT "Sorry, must be less than 18."
1630 BEEP 5000,200
1640 FOR i = 1 TO 1000: END FOR i
1650 CLS 3: GO TO 1590
1660 END IF
1670 AT 8,0
1680 INPUT "Is your rating scale out of 5,7 or 9 ? ";rate%
1690 IF rate% <> 5 AND rate% <> 7 AND rate% <> 9 THEN GOTO 1700
1700 BEEP 5000,200
1710 CLS 3: PRINT "The rating scale must be either 5, 7 or 9."
1720 FOR i = 1 TO 1000: END FOR i
1730 CLS 3: GO TO 1670
1740 END IF
1750 DIM grid%(con%,el%): DIM con_name%(con%,20):DIM el_name%(el%,20)
1760 REMark *******************************
1770 REMark * Input main grid *
1780 REMark *******************************
1790 PAPER 7:INK 0: CLS
1800 tab = 4
1810 AT 1,0: STRIP 4:CSIZE 0,1
1820 PRINT "ELEMENTS ";:CSIZE 0,0
1830 AT 2,10;
1840 FOR i = 1 TO el%
1850 temp* = i: padding
1860 END FOR i
1870 CSIZE 2,0: STRIP 2
1880 PRINT: temp$ = " CONSTRUCTS "
1890 FOR i = 1 TO LEN(temp$)
1900 AT 2 + i,2
1910 PRINT temp$(i)
1920 END FOR i
1930 tab = 2: CSIZE 0,0
1940 FOR i = 1 TO con%
1950 AT 2 + i,7: temp$ = i: padding
1960 END FOR i
1970 PRINT: STRIP 7: INK 0
1980 FOR i = 1 TO con%
1990 FOR j = 1 TO el%
2000 entry
2010 END FOR j
2020 END FOR i
2030 REMark *******************************
2040 REMark * Corrections *
2050 REMark *******************************
2060 REPeat wrong
2070 temp$ = ""
2080 AT 21,10;: CLS 3; STRIP 0; INK 7
2090 INPUT "Do you have any corrections ?";temp$
2100 IF LEN(temp$) < 1 THEN EXIT wrong
2110 IF temp$(1) <> "y" THEN EXIT wrong
2120 AT 21,10;: CLS 3
2130 PRINT "Which construct (less than ";con%;")";:INPUT " ? ";i
2140 IF i <= 0 OR i > con% THEN GO TO 2120
2150 AT 21,10;: CLS 3
2160 PRINT "Which element (less than ";el%;")";:INPUT " ? ";j
2170 IF j <= 0 OR j > el% THEN GO TO 2150
2180 AT 21,10;:CLS 3
2190 STRIP 7;INK 0
2200 entry
2210 END REPeat wrong
2220 REMark *******************************
2230 REMark * Enter construct names *
2240 REMark *******************************
2250 PAPER 0:INK 4:CLS
2260 CSIZE 1,1
Enter construct names up to 9 characters long.

FOR i = 1 TO con%
    temp* = tempi* = 
    PRINT "Construct" !i
    INPUT ?! temp*
    IF LEN(temp*) > 9 THEN temp* = temp*(1 TO 9)
    temp* = temp* & pad*; temp* = temp*(1 TO 11)
    PRINT "Pole 1": PRINT temp*
    PRINT "Pole 2": PRINT tempi*
    con_name*(i) = temp* & tempi*
END FOR i

REM* Corrections *
REPeat cwrong
CLS 3 STRIP 2: INK 7
INPUT "Do you have any corrections?" ! temp$
IF LEN(temp$) < 1 THEN EXIT cwrong
IF temp$(i) <> "y" THEN EXIT cwrong
temp* = tempi* = 
PRINT "Pole 1?": PRINT temp$
PRINT "Pole 2?": PRINT tempi$
con_name*(i) = 
INK 4: PAPER 0
REPeat cwrong
CLS 3: STRIP 2: INK 7
END REPeat cwrong

Enter element names up to 20 characters long.

FOR i = 1 TO el%
    temp* = 
    PRINT "Element" !i
    INPUT ?! temp*
    IF LEN(temp*) > 9 THEN temp* = temp*(1 TO 9)
    temp* = temp* & pad*; temp* = temp*(1 TO 11)
    PRINT "Pole 2?": PRINT temp$
    PRINT "Pole 2?": PRINT tempi$
    con_name*(i) = 
    INK 4: PAPER 0
END FOR i

REM* Element names *
PAPER 0: INK 4: CLS
CSIZE 1,1
PRINT "Enter element names up to 20 characters long."
Appendix 3

2820 IF LEN(temp$) > 20 THEN temp$ = temp$(1 TO 20)
2830 temp$ = temp$ & pad$: temp$ = temp$(1 TO 20)
2840 AT 4 + i,15; PRINT pad$; pad$
2850 AT 4 + i,15; PRINT temp$
2860 el_name$(i) = temp$
2870 END FOR i
2880 REMark "**********
2890 REMark * Corrections*
2900 REMark "**********
2910 REPeat ewrong
2920 AT 22,10;CLS 3: STRIP 2:INK 7
2930 INPUT "Do you have any corrections ?"! temp$
2940 IF LEN(temp$) < 1 THEN EXIT ewrong
2950 IF temp$(1) <> "y" THEN EXIT ewrong
2960 temp$ = ""
2970 AT 22,10;CLS 3:AT 22,10;
2980 INPUT "Which element ?"! i
2990 IF i > el$ THEN GO TO 2970
3000 AT 22,10;CLS 3:AT 22,10;
3010 INPUT "New name ?"!temp$
3020 IF LEN(temp$) > 20 THEN temp$ = temp$(1 TO 20)
3030 temp$ = temp$ & pad$: temp$ = temp$(1 TO 20)
3040 el_name$(i) = temp$
3050 PAPER 0:INK 4
3060 AT i + 4,15;PRINT temp$
3070 END REPeat ewrong
3080 temp$ = "":temp$ = gridname$
3090 long = 8: n$ = "File": flag = 1
3100 name
3110 writer
3120 END Define :REMark ""<<<<<end of start_up
3130 REMark """" <<<<<end of start_up
3140 REMark * Enter Grid *
3150 REMark """" <<<<<end of start_up
3160 Define PROCedure entry
3170 LOCal temp$: LOCAL temp$
3180 tab = 4: temp$ = "":temp$ = 0
3190 AT i + 2, (j * tab) + 8;PRINT "?": AT i + 2,(j * tab) + 6;
3200 temp$ = INKEY$: IF temp$ = "" THEN GO TO 3200
3210 IF temp$ < "0" OR temp$ > "9" THEN GO TO 3200
3220 temp = temp$
3230 IF temp <= 0 OR temp > rate%:
3240 AT 21,10:STRIP 2:INK 7
3250 PRINT " Entries must be in the range 1 to ";rate%: "
3260 BEEP 0,50,100,700,200,15
3270 FOR k = 1 TO 1000: END FOR k:BEEP
3280 AT 21,10:CLS 3:STRIP 7: INK 0
3290 GO TO 3190
3300 END IF
3310 grid%(i,j) = INT(temp$)
3320 padding: temp$ = ""
3330 END Define
3340 REMark ********************
3350 REMark * Create short names *
3360 REMark ********************
3370 DEFINE PROCEDURE namer
3380 screen
3390 MODE 8
3400 PAPER 0:CLS:INK 1
3410 CSIZE 2,1
3420 gridname$ = ""
3430 AT 4,12:PRINT "v":PAPER 6
3440 AT 5,14:PRINT pad$(1 TO long - 1)
3450 AT 5,2:PRINT n*! :INPUT "name ?" :gridname$
3460 IF flag
3470 gridname$ = gridname$ & " ________"
3480 END IF
3490 gridname$ = gridname$ & pad$: gridname$ = gridname$(1 TO long)
3500 PAPER 0:CLS:PAPER 6
3510 AT 5,2:PRINT n*! "name = " :AT 5,15 :PRINT gridname$
3530 INK 1 :PAPER 6
3540 IF LEN(temp$) < 1 THEN GO TO 3560
3550 IF temp$(1) = "n" THEN GO TO 3400
3560 screensMODE 4s CSIZE 0,0: flag = Ossci
3570 END DEFINE
3580 REMark ********************
3590 REMark * Pad string temp$ & print *
3600 REMark ********************
3610 DEFINE PROCEDURE padding
3620 REPEAT longer
3630 IF LEN(temp$) = tab THEN EXIT longer
3640 temp$ = " " & temp$
3650 END REPEAT longer
3660 PRINT temp$;
3670 END DEFINE
3680 REMark ********************
3690 REMark * Define windows *
3700 REMark ********************
3710 DEFINE PROCEDURE screen
3720 WINDOW#1,512,256,0,0: PAPER 0:CLS
3730 END DEFINE
3740 DEFINE PROCEDURE scl
3750 WINDOW#1,455,250,35,4:PAPER 0:CLS: BORDER 3,4
3760 END DEFINE
3770 REMark ********************
3780 REMark * Write data file *
3790 REMark ********************
3800 DEFINE PROCEDURE writer
3810 screen:scl:INK 2:CLS:CSIZE 3,1: AT 5,1
3820 PRINT "Writing data file "; gridname$: CSIZE 0,0
3830 temp$ = "mdv2_" & gridname$ & ".mn"
3840 OPEN_NEW #7,temp$
3850 temp$ = con%:PRINT#7,temp$
3860 temp$ = el%:PRINT#7,temp$
3870 temp$ = rate%:PRINT#7,temp$
3880 FOR i = 1 TO con%
3890   FOR j = 1 TO el%
3900       temp$ = grid%(i,j)
3910       PRINT#7, temp$;
3920   END FOR j
3930   PRINT#7
3940   END FOR i
3950   PRINT#7, temp1$:REM  ** Grid name **
3960   FOR i = 1 TO con%
3970       PRINT#7, con_name$(i)
3980   END FOR i
3990   FOR i = 1 TO el%
4000       PRINT#7, el_name$(i)
4010   END FOR i
4020   CLOSE#7
4030   gridname$ = temp1$
4040   END DEFINE
4050   REMark  ********************************************
4060   REMark  * Read from data file  *
4070   REMark  ********************************************
4080   DEFINE PROCEDURE reader
4090       LOCAL stuff$
4100       temp$ = "mdv2_" & gridname$ & ",mn"
4110   OPEN_IN #7, temp$
4120   INPUT#7, stuff$;con% = stuff$
4130   INPUT#7, stuff$;el% = stuff$
4140   INPUT#7, stuff$;rate% = stuff$
4150   DIM grid%(con%,el%)
4160   gridname$ = ""
4170   DIM con_name$(con%,20)
4180   DIM el_name$(el%,20)
4190   FOR i = 1 TO con%
4200       INPUT#7, stuff$
4210       FOR j = 1 TO LEN(stuff$)
4220           grid%(i,j) = stuff$(j)
4230   END FOR j
4240   END FOR i
4250   INPUT#7, gridname$
4260   FOR i = 1 TO con%
4270       INPUT#7, con_name$(i)
4280   END FOR i
4290   FOR i = 1 TO el%
4300       INPUT#7, el_name$(i)
4310   END FOR i
4320   CLOSE#7
4330   END DEFINE
4340   REMark  ********************************************
4350   REMark  * Output final grid  *
4360   REMark  ********************************************
4370   DEFINE PROCEDURE gridout
4380       LOCAL table1%,LOCAL table2%, LOCAL bottom
4390       LOCAL sp%,LOCAL temp%,LOCAL temp$
4400   PRINT #dv, CHR$(12); PRINT #dv, CHR$(27) & CHR$(49)
4410   sp% = 3: WIDTH#dv, 132
4420   PRINT#dv, zo%;"Cluster Presentation of Grid"
4430   PRINT#dv, zo%;gridname$;zl$
Appendix 3

4440 PRINT #dv,z2$
4450 bottom = level(lev%): bottom = (INT(bottom /10)* 10)
4460 tab1% = 8: tab2% = 11
4470 FOR i = bottom TO 99 STEP 2
4480 IF i/10 - INT(i/10) < 1E-4
4490 PRINT#dv, TO tab1%;"+";
4500 ELSE
4510 PRINT#dv, TO tab2%;"+";
4520 END IF
4530 IF lev% AND i >= INT(level(lev%) + .5)
4540 FOR j = 1 TO el% * sp%
4550 PRINT#dv;"-";
4560 END FOR j
4570 PRINT #dv, ".(";INT(level(lev%)+.5);")";
4580 lev% = lev% - 1
4590 END IF
4600 PRINT#dv
4610 END FOR i
4620 PRINT#dv, TO tab1% - 1;"100 +"
4630 unwind
4640 PRINT#dv, TO tab2% + 1;"* ";
4650 tab1% = 15
4660 REMark ****************************************
4670 REMark * Con. Nos. f t  construct scale *
4680 REMark ****************************************
4690 FOR i = 1 TO el%
4700 PRINT#dv, c%(i);: tab1% = tab1% + sp%: PRINT#dv, TO tab1%;
4710 END FOR i
4720 temp% = 100: tab1% = 82
4730 PRINT#dv, TO 82;
4740 FOR i = 1 TO 5
4750 PRINT#dv, temp%: temp% = temp% - 20: tab1% = tab1% + 10
4760 PRINT#dv, TO tab1%;
4770 END FOR i
4780 PRINT#dv: PRINT#dv, TO tab2% + 1;
4790 FOR i = 1 TO (el% * sp%) + 1:PRINT#dv,"*";
4800 PRINT#dv
4810 temp$ = ""
4820 REMark *** print main grid ****************************************
4830 FOR i = 1 TO con%
4840 temp$ = r%(i); IF LEN(temp$) < 2 THEN temp$ = " " & temp$
4850 PRINT#dv, con_name$(r%(i),1 TO 9);"";temp$;"*";
4860 FOR j = 1 TO el%
4870 temp$ = grid%(r%(i),c%(j)); padder
4880 PRINT#dv, temp$;
4890 END FOR j
4900 PRINT#dv, TO 66;
4910 PRINT#dv, con_name$(r%(i), 10 TO 20);"*
4920 temp$ = r%(i): IF LEN(temp$) < 2 THEN temp$ = " " & temp$
4930 PRINT#dv, temp$;
4940 FOR _l = 1 TO 2
4950 IF _l = 2 THEN PRINT#dv, TO 12;"*
4960 tab1% = 82 + INT(((100 - clevel(1))/2) +.5)
4970 PRINT #dv, TO tab1%;"l";

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4980 FOR k = S TO clev%
4990 tab1% = tab1% + INT(((clevel(k - 1) - clevel(k)))/2) + .5
5000 PRINT#dv, TO tab1%; "!"
5010 END FOR k: PRINT#dv
5020 END FOR i
5030 END FOR i
5040 tab1% = B2 + (((100 - clevel(1))/2) - 1)
5050 PRINT#dv, TO tab1%; INT(clevel(1) + .5)
5060 FOR k = 2 TO clev%
5070 tab1% = tab1% + ((clevel(k - 1) - clevel(k))/2)
5080 PRINT#dv, TO tab1%; INT(clevel(k) + .5)
5090 END FOR k: PRINT#dv
5100 temp% = "*
5110 PRINT #dv, TO 12;
5120 FOR i = 1 TO e1%: PRINT#dv, temp%: END FOR i
5130 PRINT#dv
5140 FOR i = e1% TO 1 STEP - 1
5150 PRINT#dv, TO 12;
5160 FOR j = 1 TO i - 1
5170 PRINT#dv, temp%;
5180 END FOR j
5190 PRINT#dv, " & e1_name$(c%((i))
5200 END FOR i
5210 PRINT#dv: PRINT#dv,"(C) P.R. Gamble 1984"
5220 PRINT#dv, z3$
5230 END Define
5240 DEFINE PROCEDURE padder
5250 Repet pad
5260 IF LEN(temp%) = sp% THEN EXIT pad
5270 temp% = " " & temp%
5280 END Repet pad
5290 END DEFINE
5300 DEFINE PROCEDURE unwind
5310 temp% = 1
5320 FOR i = 1 TO (con% * 2) - 1 STEP 2
5330 r%(temp%) = con_list$(i TO i + 1)
5340 temp% = temp% + 1
5350 END FOR i
5360 temp% = 1
5370 FOR i = 1 TO (e1% * 2) - 1 STEP 2
5380 c%(temp%) = list$(i TO i + 1)
5390 temp% = temp% + 1
5400 END FOR i
5410 END DEFINE
5420 STOP
5430 REMark ********************************************
5440 REMark * Reverse raw grid *
5450 REMark ********************************************
5460 DEFINE PROCEDURE reverse
5470 LOCAL temp%; temp% = rate% + 1
5480 FOR i = 1 TO con%
5490 FOR j = 1 TO e1%
5500 revers%(i,j) = temp% - grid%(i,j)
5510 END FOR j
5520 END FOR i
5530 END DEFINE
5540 REMark **********************************************
5550 REMark * Compute construct scores *
5560 REMark * Note: matches with reversed* 
5570 REMark * construct at the same time*
5580 REMark **********************************************
5590 DEFINE PROCEDURE con_score
5600 FOR i = 1 TO con% - 1
5610 FOR k = i+1 TO con%
5620 IF score%(i,k) <> 0
5630 GO TO 5720
5640 END IF
5650 diff% = 0: rev% = 0
5660 FOR j = 1 TO el%
5670 diff% = diff% + ABS(grid%(i,j) - grid%(k,j))
5680 rev% = rev% + ABS(grid%(i,j) - revers%(k,j))
5690 END FOR j
5700 score%(i,k) = diff%: score%(k,i) = diff%
5710 rev_score%(i,k) = rev%: rev_score%(k,i) = rev%
5720 END FOR k
5730 END FOR i
5740 END DEFINE
5750 REMark **********************************************
5760 REMark * Compute Construct Mapping *
5770 REMark **********************************************
5780 DEFINE PROCEDURE con_mapping
5790 LOCAL temp%
5800 temp% = (rate% - 1) * el%
5810 FOR i = 1 TO con% - 1
5820 FOR k = i+1 TO con%
5830 IF gridmap(isk) <> 0
5840 GO TO 6060
5850 END IF
5860 gridmap(i,k) = ((conmatch% * score%(i,k)) / temp%) + century%
5870 revmap(i,k) = ((conmatch% * rev_score%(i,k)) / temp%) + century%
5880 gridmap(k,i) = gridmap(i,k): revmap(k,i) = revmap(i,k)
5890 END FOR k
5900 END FOR i
5910 END DEFINE
5920 REMark **********************************************
5930 REMark * Print Construct Scores *
5940 REMark **********************************************
5950 DEFINE PROCEDURE gridprint
5960 LOCAL tab%: LOCAL temp%:LOCAL temp$
5970 temp$ = ""
5980 IF dev = 1
5990 WIDTH#dev, 80
6000 INK 4: CLS
6010 ELSE
6020 WIDTH#dev, 132
6030 END IF
6040 PRINT#dev,z0$;"CONSTRUCT MATCHING SCORES";z1$
6050 PRINT#dev,z0$;gridname$;z1$
6060 PRINT#dev,"The UPPER RIGHT half shows construct scores"
6070 PRINT#dev,"The LOWER LEFT the reversed construct scores"
6060 IF dev = 1
6090 INK 6
6100 END IF
6110 tab% = 5
6120 temp% = 0
6130 PRINT#dev
6140 PRINT#dev, TO tab% - 1;"* ";
6150 tab% = 7
6160 FOR i = 1 TO con%
6170 PRINT#dev, i;:tab% = tab% + 5:PRINT#dev, TO tab%;
6180 END FOR i
6190 PRINT#dev
6200 FOR i = 1 TO (con% * 5) + 5:PRINT#dev,"*";
6210 PRINT#dev |
6220 FOR i = 1 TO con%
6230 IF i < 10 THEN PRINT#dev," ";
6240 PRINT#dev,i:" *";
6250 FOR j = 1 TO con%
6260 IF i = j
6270 PRINT#dev," ";
6280 GO TO 6400
6290 END IF
6300 IF j > i
6310 temp% = gridmap(i,j)
6320 ELSE temp% = revmap(i,j)
6330 END IF
6340 END IF temp% = temp%
6350 REPeat pad
6360 IF LEN(temp$) = 5 THEN EXIT pad
6370 temp$ = " " & temp$
6380 END REPeat pad
6390 PRINT#dev,temp$;
6400 END FOR j
6410 PRINT#dev: IF dev = 5 THEN PRINT#dev
6420 END FOR i
6430 END DEFINE
6440 REMark ***************************************
6450 REMark * Construct Tree *
6460 REMark * Uses copy_gridmap values *
6470 REMark ***************************************
6480 DEFINE PROCedure con_tree
6490 LOCal across; LOCal down; LOCal temp$
6500 LOCal max; LOCal row%; LOCal col%; LOCal check%(con%)
6510 IF NOT done% THEN con_match
6520 FOR i = 1 TO con%
6530 rflag%(i) = 0: cflag%(i) = 0
6540 END FOR i
6550 AT 12,12: CLS 3
6555 AT 12,14: PRINT "Searching for closest constructs. ": noise
6560 row% = 1: col% = 1
6570 across = con%; down = con%
6580 FOR j = 1 TO con% - 1
6590 max = 0
6600  FOR i = 1 TO across - 1
6610   IF rflag%(i) = 2 OR check%(i) = 2
6620      GO TO 6770
6630   END IF
6640  FOR k = i + 1 TO down
6650   IF rflag%(i) >= 1 AND cflag%(k) >= 1
6660      FOR l = 1 TO j
6662     IF r%(l) = i AND c%(l) = k
6664        GO TO 6760
6666     END IF
6668   END FOR l
6670   END IF
6680  IF check%(k) = 2
6690      GO TO 6760.
6700  END IF
6710  IF copy_gridmap(i,k) > max
6720      max = copy_gridmap(i,k)
6730     row% = i
6740    col% = k
6750   END IF
6760  END FOR k
6770  END FOR i
6780  r%(j) = row%c%(j) = col%
6790  rflag%(row%) = rflag%(row%) + 1;cflag%(col%) = cflag%(col%)+ 1
6800  check%(row%) = check%(row%) + 1;check%(col%) = check%(col%)+ 1
6810  END FOR j
6820  END DEFINE
6830  REMark ******************
6840  REMark * Identify & reverse constructs *
6850  REMark ******************
6860  DEFINE PROCEDURE con_reverse
6870  LOCAL temp$: LOCAL check%(con%)
6880  temp$ = ""
6890  FOR i = 1 TO con% - 1
6900    IF revmap(r%(i),c%(i)) > gridmap(r%(i),c%(i))
6910       IF NOT check%(r%(i))
6920          PRINT"%d,""Construct ";r%(i);" reversed."
6930      FOR j = 1 TO el%
6940       grid%(r%(i),j) = revers%(r%(i),j)
6950      END FOR j
6960    temp$ = con_name$(r%(i), 1 TO 9)
6970    con_name$(r%(i), 1 TO 9) = con_name$(r%(i), 12 TO 20)
6980    con_name$(r%(i), 12 TO 20) = temp$
6990    check%(r%(i)) = 1
7000  END IF
7010  END IF
7020  END FOR i
7030  END DEFINE
7040  REMark ******************
7050  REMark * Find Max Positive Match *
7060  REMark ******************
7070  DEFINE PROCEDURE con_match
7080  FOR i = 1 TO con%
7090    FOR j = 1 TO con%
7100      copy_gridmap(i,j) = gridmap(i,j)
IF revmap(i,j) > copy_gridmap(i,j)
copy_gridmap(i,j) = revmap(i,j)
END IF
END FOR j
END FOR i
END DEFINE

REMark ******************************************************
REMark * Compute element scores *
REMark ******************************************************
DEFINE PROCEDURE el_score
FOR i = 1 TO el% - 1
FOR k = i+1 TO el%
IF el_score%(i,k) <> 0
GO TO 7320
END IF
diff% = 0
END FOR j
e1_score%(i,k) = diff%
e1_score%(k,i) = diff%
END FOR k
END FOR i
END DEFINE

REMark ******************************************************
REMark * Compute Element Mapping *
REMark ******************************************************
DEFINE PROCEDURE el_mapping
LOCAL temp%
temp% = el%(rate% - 1) * con%
END IF
END FOR k
END FOR i
END DEFINE

REMark ******************************************************
REMark * Element Tree *
REMark ******************************************************
DEFINE PROCEDURE el_tree
LOCAL across; LOCAL down
LOCAL max; LOCAL row%; LOCAL col%; LOCAL check%(el%)
AT 12,12:; CLS 3
AT 12,14:; PRINT "Searching for closest elements."; noise
FOR i = 1 TO el%
erflag%(i) = 0: ecflag%(i) = 0
END FOR i
row% = 1: col% = 1
across = el%: down = el%
FOR j = 1 TO el% - 1
7630 max = 0

FOR i = 1 TO down
    IF erflag%(i) = 2 OR check%(i) = 2
        GO TO 7810
    END IF
    FOR k = i + 1 TO across
        IF erflag%(i) >= 1 AND ecflag%(k) >= 1
            FOR l = 1 TO j
                IF er%(l) = i AND ec%(l) = k
                    GO TO 7800
                END IF
            END FOR l
            END IF
            IF check%(k) = 2
                GO TO 7800
            END IF
            IF elmap(i,k) > max
                max = elmap(i,k)
                row% = i
                col% = k
            END IF
        END FOR k
    END FOR i

er%(j) = row%: ec%(j) = col%
erflag%(row%) = erflag%(row%) + 1: ecflag%(col%) = ecflag%(col%) + 1
check%(row%) = check%(row%) + 1: check%(col%) = check%(col%) + 1
END FOR j

END DEFine

REM ark ***************************
REM ark * Print Element Scores *
REM ark ***************************

DEF ine PROC edure elprint
LOCAL tab%: LOCAL temp%: LOCAL temp$
temp$ = ""
IF dev = 1
    WIDTH#dev, 80
    INK 4: CLS
ELSE
    WIDTH#dev, 132
    END IF
    tab% = 5
    temp% = 0
    PRINT#dev
    FOR i = 1 TO el%
        PRINT#dev, TO tab% - 1;"* ";
    END FOR i
    FOR i = 1 TO el%
        PRINT#dev, i;;tab% = tab% + 5;PRINT#dev, TO tab%;
    END FOR i
    END IF
    PRINT#dev
8150 FOR i = 1 TO (el% * 5) + 5:PRINT#dev,"*";
8160 PRINT#dev
8170 FOR i = 1 TO el%
8180 IF i < 10 THEN PRINT#dev," ";
8190 PRINT#dev,i"," *
8200 FOR j = 1 TO el%
8210 IF i = j
8220 PRINT#dev," ";
8230 GO TO 8310
8240 END IF
8250 temp$ = INT(elmap(i,j))
8260 REPeat pad
8270 IF LEN(temp$) = 5 THEN EXIT pad
8280 temp$ = ",& temp$
8290 END REPeat pad
8300 PRINT#dev,temp$;
8310 END FOR j
8320 PRINT#dev: IF dev = 5 THEN PRINT#dev
8330 END FOR i
8340 END DEFINE
8350 REMark ******************************************
8360 REMark * Move data from elmap into copy_gridmap *
8370 REMark * and data from er / ec into r / c *
8380 REMark ******************************************
8390 DEFINE PROCEDURE elmove
8400 FOR i = 1 TO size%
8410 r%(i) = 0: c%(i) = 0: clevel(i) = level(i)
8420 FOR j = 1 TO size%
8430 copy_gridmap(i,j) = 0
8440 END FOR j
8450 END FOR i
8460 clevel(size% + 1) = level(size% + 1)
8470 clevel(size% + 2) = level(size% + 2)
8480 FOR i = 1 TO el%
8490 r%(i) = er%(i): c%(i) = ec%(i): clevel(i) = 0
8500 FOR j = 1 TO el%
8510 copy_gridmap(i,j) = elmap(i,j)
8520 END FOR j
8530 END FOR i
8540 eldata = 1: clev% = lev%
8550 END DEFINE
8560 REMark ******************************************
8570 REMark * Construct Printing Order *
8580 REMark ******************************************
8590 DEFINE PROCEDURE con_order
8600 LOCAL possFULL:LOCAL full:LOCAL check(size%):LOCAL mk
8610 LOCAL temp$:LOCAL temp_1$:LOCAL temp_2$:LOCAL b$:LOCAL a$
8620 LOCAL stor%(4):LOCAL max:LOCAL tempmax
8630 LOCAL neX(4):LOCAL neXx$:LOCAL neXx$: LOCAL keep$: LOCAL temp
8650 temp$ = r%(i): temper
8660 list$ = temp$ & list$
8670 temp$ = c%(i): temper
8680 list$ = list$ & temp$
8690 reset$ = 0
8700 check(r%(1)) = 1
8710 check(c%(1)) = 1
8720 IF eldata
8730 full = el% - 2: top% = el%
8740 ELSE
8750 full = con% - 2: top% = con%
8760 END IF
8770 pos = 2
8780 REPeat order
8790 IF full = 0 THEN EXIT order
8800 IF NOT check(r%(pos)) AND NOT check(c%(pos))
8810 IF pos = 2
8820 adders GO TO 9310
8830 END IF
8840 nex% = 0: nex1 = pos: a = 1
8850 FOR i = nex1 + 1 TO top% - 1
8860 IF nex% > 0 THEN GO TO 8990
8870 IF r%(i) = r%(pos)
8880 nex(i) = i: nex% = i: temp = 1
8890 END IF
8900 IF r%(i) = c%(pos)
8910 nex(2) = i: nex% = i: temp = 1
8920 END IF
8930 IF c%(i) = r%(pos)
8940 nex(3) = i: nex% = i: temp = 2
8950 END IF
8960 IF c%(i) = c%(pos)
8970 nex(4) = i: nex% = i: temp = 2
8980 END IF
8990 END FOR i
9000 IF NOT nex%
9010 adder: GO TO 9310
9020 END IF
9030 nex1 = nex%
9040 IF temp = 1 THEN b$ = c%(nex%) 
9050 IF temp = 2 THEN b$ = r%(nex%) 
9060 mk = 2: a$ = ": IF LEN(b$) < 2 THEN b$ = "0" & b$
9070 temp = 0
9080 FOR i = 1 TO LEN(list$) STEP 2
9090 a$ = list$(mk - 1 TO mk)
9100 IF a$ = b$
9110 temp = mk
9120 END IF
9130 mk = mk + 2
9140 END FOR i
9150 IF temp = 0 AND a < 2
9160 a = a + 1: nex% = 0
9170 GO TO 8850
9180 END IF
9190 IF temp = 0 AND a = 2
9200 adder: GO TO 9310
9210 END IF
9220 mk = temp
9230 IF mk/2 = 1 OR mk = LEN(list$)
9240 adder: GO TO 9310
9250      END IF
9260      marker: keep$ = ""
9270      keep$ = list$(mk - 1 TO LEN(list$))
9280      list$ = list$(1 TO mk - 2)
9290      adder
9300      list$ = list$ & keep$
9310      GO TO 9780
9320      END IF
9330    IF full = 0 THEN EXIT order
9340      IF check(r%(pos)) AND NOT check(c%(pos))
9350      temp$ = c%(pos): temper
9360      b$ = r%(pos)
9370      IF LEN(b$) < 2
9380      b$ = "0" & b$
9390      END IF
9400      mk = 2: flag = 0
9410      insert
9420      GO TO 9780
9430      END IF
9440    IF full = 0 THEN EXIT order
9450      IF NOT check(r%(pos)) AND check(c%(pos))
9460      temp$ = r%(pos): temper
9470      b$ = c%(pos)
9480      IF LEN(b$) < 2
9490      b$ = "0" & b$
9500      END IF
9510      mk = 2: flag = 1
9520      insert
9530      GO TO 9780
9540      END IF
9550    IF full = 0 THEN EXIT order
9560      IF check(r%(pos)) AND check(c%(pos))
9570      check_pos
9580      IF ok%
9590      pos = pos + 1
9600      GO TO 9780
9610      END IF
9620      copy_gridmap(r%(pos) ,c%(pos)) = -999
9630      list$ = "": done% = 1
9640      reset% = 1
9650      IF eldata
9660      elmap(c%(pos),r%(pos)) = -999
9670      elmap(r%(pos),c%(pos)) = -999
9680      el_tree
9690      FOR 1 = 1 TO el%
9700      r%(1) = er%(1): c%(1) = ec%(1)
9710      END FOR 1
9720      EXIT order
9730      ELSE
9740      con_tree
9750      EXIT order
9760      END IF
9770      END IF
9780      END REPeat order
9790      IF reset% = 1 THEN con_order
Appendix 3

9800 END DEFINE
9810 REMark **************************
9820 REMark * Add pair to list$ *
9830 REMark **************************
9840 DEFINE PROCEDURE adder
9850 temp$ = r%(pos): temper: temp_l$ = temp$
9860 temp$ = c%(pos): temper: temp_2$ = temp$
9870 a$ = list$(1 TO 2): temp = LEN(list$): b$ = list$(temp-1 TO temp)
9880 stor%(1) = copy_gridmap(temp_l$,a$): stor%(2) = copy_gridmap(temp_2$,a$)
9890 stor%(3) = copy_gridmap(temp_l$,b$): stor%(4) = copy_gridmap(temp_2$,b$)
9900 max = 0: tempmax = 0
9910 FOR i = 1 TO 4
9920 IF stor%(i) > tempmax
9930 max = i: tempmax = stor%(i)
9940 END IF
9950 END FOR i
9960 SELECT ON max
9970 ON max = 1
9980 list$ = temp_2$ & temp_l$ & list$
9990 ON max = 2
10000 list$ = temp_l$ & temp_2$ & list$
10010 ON max = 3
10020 list$ = list$ & temp_l$ & temp_2$
10030 ON max = 4
10040 list$ = list$ & temp_2$ & temp_l$
10050 END SELECT
10060 full = full - 2
10070 check(r%(pos)) = Is check(c%(pos)) = 1
10080 pos = pos + 1
10090 END DEFINE
10100 REMark **************************
10110 REMark * Add 1 item to list$ *
10120 REMark **************************
10130 DEFINE PROCEDURE insert
10140 a$ = ""
10150 REPEAT looker
10160 a$ = list$(mk-1 TO mk)
10170 IF a$ = b$ THEN EXIT looker
10180 mk = mk + 2
10190 END REPEAT looker
10200 IF mk/2 = 1
10210 list$ = temp$ & list$
10220 GO TO 10370
10230 END IF
10240 IF mk/2 = top$ - 1
10250 list$ = list$ & temp$
10260 GO TO 10370
10270 END IF
10280 IF mk/2 = LEN(list$)/2
10290 list$ = list$ & temp$
10300 GO TO 10370
10310 END IF
10320 marker
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10330 temp_1$ = list$(1 TO mk-2): temp_2$ = list$(mk-1 TO LEN(list$))
10340 temp_1$ = temp_1$ & temp$
10350 list$ = ""
10360 list$ = temp_1$ & temp_2$
10370 IF NOT flag
10380 check(c% (pos)) = 1
10390 END IF
10400 IF flag
10410 check(r% (pos)) = 1
10420 END IF
10430 full = full - 1: pos = pos + 1
10440 END Define
10450 REMark ****************************
10460 REMark * Avoid splitting pairs *
10470 REMark ****************************
10480 DEFINE PROCEDURE marker
10490 LOCAL a: LOCAL b: LOCAL flag
10500 a = list$(mk - 3 TO ink - 2); b = list$(mk - 1 TO mk)
10510 flag = 0
10520 FOR i = 1 TO pos
10530 IF r%(i) = a AND c% (i) = b
10540 flag = 1
10550 END IF
10560 IF c%(i) = a AND r%(i) = b
10570 flag = 1
10580 END IF
10590 END FOR i
10600 a = list$(mk - 1 TO mk): b = list$(mk + 1 TO mk + 2)
10610 FOR i = 1 TO pos
10620 IF r%(i) = a AND c% (i) = b
10630 flag = 0
10640 END IF
10650 IF c%(i) = a AND r%(i) = b
10660 flag = 0
10670 END IF
10680 END FOR i
10690 IF flag
10700 mk = mk + 2
10710 END IF
10720 END Define
10730 REMark ****************************
10740 REMark * Pad out string temp$ *
10750 REMark ****************************
10760 DEFINE PROCEDURE temper
10770 LOCAL a$
10780 a$ = "0"
10790 IF LEN(temp$) < 2
10800 temp$ = a$ & temp$
10810 END IF
10820 END Define
10830 REMark ****************************
10840 REMark * Identify and describe tree links *
10850 REMark * Data always in copy_gridmap, r & c*
10860 REMark ****************************
10870 DEFINE PROCEDURE tree_describe
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10880 LOCAL look
10890 lev = 0
10900 IF eldata
10910  look = el1
10920  ELSE
10930  look = con
10940  END IF
10950 lev = 1: level(1) = copy_gridmap(r(1),c(1))
10960 FOR i = 2 TO look - 1
10970  IF copy_gridmap(r(i-1),c(i-1)) <> copy_gridmap(r(i),c(i))
10980    lev = lev + 1: level(lev) = copy_gridmap(r(i),c(i))
10990  END IF
11000  END FOR i
11010 prin_list
11020 END DEFINE
11030 REMark ********************************
11040 REMark * Describe joining of clusters *
11050 REMark ********************************
11060 DEFINE PROCEDURE prin_list
11070 LOCAL check(size):LOCAL full:LOCAL pos:LOCAL depth
11080 LOCAL temp:LOCAL temp2:LOCAL flag:LOCAL set
11090 LOCAL activ(size):LOCAL jmp:LOCAL tree(size, lev + 5)
11100 node = look + 1: two_n = 0: jmp = 0: temp = 0: temp2 = 0
11110 pos = 1: full = look - 2: depth = 1: set = 0
11120 row = r(1): col = c(1): match = copy_gridmap(r(1),c(1))
11130 spier
11140 check(r(1)) = 1: check(c(1)) = 1
11150 tree(r(pos),depth) = node: tree(c(pos),depth) = node
11160 REPEAT linker
11170 FOR i = 1 TO size
11180  activ(i) = 0
11190  END FOR i
11200 IF full = 0 THEN EXIT linker
11210  pos = pos + 1: node = node + 1
11220  IF check(r(pos)) < depth AND check(c(pos)) < depth
11230    add_link
11240   GO TO 11330
11250  END IF
11260  IF check(r(pos)) < depth OR check(c(pos)) < depth
11270    in_link
11280   GO TO 11330
11290  END IF
11300  IF check(r(pos)) = depth AND check(c(pos)) = depth
11310    ex_link
11320  END IF
11330  IF jmp AND NOT r(pos + 1)
11340    add_inside
11350  jmp = 0: full = 0:
11360  END IF
11370  IF jmp AND jmp > level(depth + set)
11380    add_inside
11390  END IF
11400  END REPEAT linker
11410 END DEFINE
11420 REMark ******************
11430 REMark * Add a new pair *
11440 REMark ******************
11450 DEFINE PROCEDURE add_link
11460 activ%(r%(pos)) = 1: activ%(c%(pos)) = 1
11470 row% = r%(pos); col% = c%(pos)
11480 match = copy_gridmap(r%(pos), c%(pos))
11490 spieler
11500 IF match <> level(depth%)
11510 depth% = depth% + 1
11520 END IF
11530 tree%(r%(pos), depth%) = node%: tree%(c%(pos), depth%) = node%
11540 check%(r%(pos)) = depth%: check%(c%(pos)) = depth%
11550 tree_up: full = full - 1
11560 END DEFINE
11570 REMark *************************
11580 REMark * Insert extra new pair *
11590 REMark *************************
11600 DEFINE PROCEDURE ex_link
11610 sharp_end
11620 IF NOT flag%
11630 sharp_link
11640 RETURN
11650 END IF
11660 activ%(r%(pos)) = 1: activ%(c%(pos)) = 1
11670 row% = tree%(r%(pos), depth%): col% = tree%(c%(pos), depth%)
11680 match = copy_gridmap(r%(pos), c%(pos))
11690 spieler
11700 IF match <> level(depth%)
11710 depth% = depth% + 1
11720 END IF
11730 IF tree%(r%(pos), depth%) = node% - 1
11740 two_n% = tree%(c%(pos), depth%)
11750 ELSE
11760 two_n% = tree%(r%(pos), depth%)
11770 END IF
11780 tree%(r%(pos), depth%) = node%: tree%(c%(pos), depth%) = node%
11790 check%(r%(pos)) = depth%: check%(c%(pos)) = depth%
11800 tree_up: full = full - 1
11810 END DEFINE
11820 REMark *************************
11830 REMark * Add single link *
11840 REMark *************************
11850 DEFINE PROCEDURE in_link
11860 activ%(r%(pos)) = 1: activ%(c%(pos)) = 1
11870 IF check%(r%(pos)) < depth%
11880 col% = tree%(c%(pos), depth%)
11890 row% = r%(pos)
11900 match = copy_gridmap(row%, c%(pos))
11910 spieler
11920 IF copy_gridmap(row%, c%(pos)) <> level(depth%)
11930 depth% = depth% + 1
11940 END IF
11950 tree%(r%(pos), depth%) = node%
11960 check%(r%(pos)) = depth%
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11970 tree_up
11980 END IF
11990 IF check%(c%(pos)) < depth%
12000  row% = tree%(r%(pos),depth%)% 
12010  col% = c%(pos) 
12020  match = copy_gridmap(r%(pos),col%)
12030  spierer
12040  IF copy_gridmap(r%(pos),col%) <> level(depth%)
12050    depth% = depth% + 1
12060  END IF
12070  tree%(c%(pos),depth%) = node%
12080  check%(c%(pos)) = depth%
12090  tree_up
12100  END IF
12110  full = full - 1
12120 END DEFINE
12130 REMark **************************************************
12140 REMark * Format and print cluster details *
12150 REMark **************************************************
12160 DEFINE PROCEDURE spieler
12170 LOCAL row$;LOCAL col$;LOCAL node$;LOCAL match$; LOCAL temp
12180 temp = match
12190 row$ = row' /,  
12200 IF LEN(row*) < 2 THEN row* = " " & row$ 
12210 col$ = col%
12220 IF LEN(col%)< 2 THEN col* = " " & col$ 
12230 node$ = node%;IF LEN(node%) < 2 THEN node* = " " & node$ 
12240 match = INT(match * 100 + .5)/100; match* = match 
12250 IF match < 10 THEN match$ = " " & match$ 
12260 PRINT#dev,"Join ";row$;" and ";col$;" to make cluster ";node$;  
12270 PRINT#dev;" at ";match$;"%";  
12280 match = temp  
12290 IF jmp = level(depth%)  
12300 PRINT#dev," (join two main clusters)"  
12310 ELSE
12320 PRINT#dev  
12330 END IF
12340 REMark  
12350 END DEFINE
12360 REMark **************************************************
12370 REMark * Find if tree/cluster comes to a point *
12380 REMark **************************************************
12390 DEFINE PROCEDURE sharp_end
12400 LOCAL temp%; LOCAL bot%
12410 REMark ** flag% set to 0 if both nodes in same cluster **
12420 bot% = con%  
12430 IF eldata THEN bot% = el%
12440 temp% = tree%(r%(pos),depth%); flag% = 0  
12450 FOR i = 1 TO bot%  
12460 IF tree%(i,depth%) <> temp%  
12470    GO TO 12520  
12480 END IF  
12490 IF tree%(i,depth%) <> temp%  
12500   flag% = 1  
12510 END IF
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12520 END FOR i
12530 IF tree%(c%(pos),depth%) = temp% THEN flag% = 0
12540 END DEFINE
12550 REMARK ************************************************************
12560 REMARK * Update status of tree array *
12570 REMARK ************************************************************
12580 DEFINE PROCEDURE tree_up
12590 LOCAL old1%:LOCAL a1:LOCAL a2:LOCAL old1%:LOCAL old2%
12600 a1 = 0: a2 = 0: old1% = 0
12610 FOR i = 1 TO size%
12620 IF activ%(i) AND tree%(i,depth% - 1)
12630 old% = tree%(i,depth% - 1)
12640 tree%(i,depth%) = node%
12650 twig_check .
12660 check%(i) = depth%
12670 END IF
12680 END FOR i
12690 FOR i = 1 TO size%
12700 IF tree%(i,depth% - 1) AND NOT tree%(i,depth%)
12710 tree%(i,depth%) = tree%(i,depth% - 1)
12720 check%(i) = depth%
12730 END IF
12740 END FOR i
12750 IF depth% = 1
12760 IF tree%(r%(pos),i) = node%
12770 old1% = tree%(c%(pos),1)
12780 ELSE
12790 old1% = tree%(r%(pos),1)
12800 END IF
12810 IF old1%
12820 FOR i = 1 TO size%
12830 IF tree%(i,1) = old1%
12840 tree%(i,1) = node%
12850 END IF
12860 END FOR i
12870 END IF
12880 END IF
12890 IF depth% > 1
12900 FOR i = 1 TO size%
12910 IF activ%(i)
12920 IF a1
12930 a2 = i
12940 ELSE a1 = i
12950 END IF
12960 END IF
12970 END FOR i
12980 IF NOT tree%(a1,depth% - 1) AND tree%(a2,depth% - 1)
12990 tree%(a1,depth% - 1) = tree%(a2,depth% - 1)
13000 END IF
13010 IF NOT tree%(a2,depth% - 1) AND tree%(a1,depth% - 1)
13020 tree%(a2,depth% - 1) = tree%(a1,depth% - 1)
13030 END IF
13040 IF NOT tree%(a1,depth% - 1) AND NOT tree%(a2,depth% - 1)
13050 tree%(a1,depth% - 1) = node%: tree%(a2,depth% - 1) = node%
13060 END IF
13070 IF tree%(a1, depth% -1) <> tree%(a2, depth% -1)
13080 old1% = tree%(a1, depth% -1)
13090 old2% = tree%(a2, depth% -1)
13100 a1 = old1%; a2 = old2%
13110 IF old2% > old1%
13120 a1 = old2%; a2 = old1%
13130 END IF
13140 FOR i = 1 TO size%
13150 IF tree%(i, depth% -1) = a2
13160 tree%(i, depth% -1) = a1
13170 END IF
13180 END FOR i
13190 END IF
13200 END IF
13210 GO TO 13320; REMark <<<<< Diagnostic Sequence >>>>
13220 dev = 1
13230 PRINT#dev, "Current status of tree"
13240 FOR i = 1 TO look%
13250 PRINT#dev, "i = ";i,
13260 FOR j = 1 TO depth%
13270 PRINT#dev, tree%(i, j),
13280 END FOR j
13290 PRINT#dev, " <";check%(i);" >"
13300 END FOR i
13310 STOP
13320 END DEFINE
13330 REMark **********************
13340 REMark * Copy other affected rows *
13350 REMark **********************
13360 DEFINE PROCEDURE twig_check
13370 FOR j = 1 TO size%
13380 FOR k = 1 TO depth%
13390 IF tree%(j, k) = old%
13400 tree%(j, depth%) = node%
13410 check%(j) = depth%
13420 END IF
13430 END FOR k
13440 END FOR j
13450 END DEFINE
13460 REMark ****************************************
13470 REMark * Find new pair match if tree comes to a point *
13480 REMark ****************************************
13490 DEFINE PROCEDURE sharp_link
13500 LOCAL stor%(4); LOCAL max; LOCAL tempmax
13510 IF full = 1
13520 last_join
13530 RETURN
13540 END IF
13550 stor%(1) = r%(pos); stor%(2) = c%(pos)
13560 stor%(3) = r%(pos + 1); stor%(4) = c%(pos + 1)
13570 max = 0; tempmax = 0
13580 FOR i = 1 TO 2
13590 FOR j = 3 TO 4
13600 IF copy_gridmap(stor%(i), stor%(j)) > tempmax
13610 tempmax = copy_gridmap(stor%(i), stor%(j)); max = i * j

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14170   END IF
14180   END FOR 1
14190   END REPeat loop
14200   IF lev% = templev% THEN set% = 0
14210   IF lev% = templev% AND level(depth%) + 1 > jmp
14220     set% = 2
14230   END IF
14240   END DEFINE
14250   REMark ************************************
14260   REMark * Add new pair not normally in tree *
14270   REMark ************************************
14280   DEFINE PROCedure add_inside
14290   LOCAL tl%:
14300   re_order_list -
14310   node% = node% + 1
14320   tl% = r%(pos):t2% = c%(pos)
14330   r%(pos) = temp_r%:c%(pos) = temp_c%
14340   t3 = copy_gridmap(r%(pos),c%(pos))
14350   copy_gridmap(r%(pos),c%(pos)) = jmp
14360   IF check%(r%(pos)) = depth% AND check%(c%(pos)) = depth%
14370     ex_link
14380   GO TO 14430
14390   END IF
14400   IF check%(r%(pos)) < depth% OR check%(c%(pos)) < depth%
14410     in_link
14420   END IF
14430   copy_gridmap(r%(pos),c%(pos)) = t3
14440   r%(pos) = t1%:c%(pos) = t2%
14450   jmp = 0: temp_r% = 0: temp_c% = 0
14460   END DEFINE
14470   REMark ************************************
14480   REMark * Last pair are inside same cluster *
14490   REMark ************************************
14500   DEFINE PROCedure last_join
14510   sharp_end
14520   IF flag%
14530   row% = tree%(r%(pos),depth%)
14540   col% = tree%(c%(pos),depth%)
14550   IF row% = col% THEN backtrack
14560   GO TO 14590
14570   END IF
14580   row% = node% - 1: col% = tree%(c%(pos),depth%)
14590   IF row% = col% THEN backtrack
14590   match = copy_gridmap(r%(pos),c%(pos))
14600   spieler
14610   full = 0
14620   END DEFINE
14630   REMark ************************************
14640   REMark * Reset Listing Window *
14650   REMark ************************************
14660   DEFINE PROCedure lister
14670   WINDOW #2,512,200,0,0:PAPER 7:CLS
14680   WINDOW #2,485,200,25,0
14690   PAPER #2: INK #2,2
14700   CLS #2: CSIZE#2,1;0:CSIZE#0,1,0
LIST 14500 TO 14630
END D E F I N E
R E M a r k ****************************
R E M a r k  * Reset Screen Windows etc.*
R E M a r k ****************************
D E F I N E  P R O C e d u r e ending
W I N D O W 512,256,0,0
P A P E R 0: CLS
W I N D O W #0,485,56,25,200
W I N D O W #1,240,200,256,0
W I N D O W #2,235,200,20,0
P A P E R #1,2:INK #1,7:CLS #1
P A P E R #2,7:INK #2,2:CLS #2
P A P E R #0,0:INK #0,4:CLS #0
O P E N #5,ser1 :B A U D #5, 1200
E N D D E F I N E
R E M a r k ********************************************
R E M a r k  * Re-order list if needed to join new pair *
R E M a r k ********************************************
D E F I N E  P R O C e d u r e re_order_list
L O C a l un%: LOCAL un2%: LOCAL cpos%: LOCAL rpos%
L O C a l unpos%: LOCAL un2pos%
L O C a l r$: LOCAL c$: LOCAL un$: LOCAL un2$
I F c(p +1) = temp$
U n% = r%(p +1): un2% = c%(p +1)
I F t ree%(un%,depth%) = tree%(tempc%,depth%) THEN R E T U R N
S E L E
U n% = c%(p +1): un2% = r%(p +1)
I F t ree%(un%,depth%) = tree%(tempr%,depth%) THEN R E T U R N
E N D I F
I F rpos% > cpos% THEN G O T O 15180
S E L E
I F unpos% > rpos% AND unpos% < cpos%
G O T O 15250
E L S E
R E T U R N
E N D I F
I F rpos% > cpos% THEN G O T O 15180
S E L E
I F unpos% > rpos% AND unpos% < cpos%
G O T O 15250
E L S E
R E T U R N
E N D I F
R E M a r k  ** Find end un2% is at and re-order list **
U n2pos% = un2$ INSTR list$
P R. G a m b l e
part2$ = list$ (unpos% + 2 TO LEN(list$))
IF un2pos% >= LEN(list$)/2
  list$ = part1$ & part2$ & un$
ELSE
  list$ = un$ & part1$ & part2$
END IF

REM $ routine used in con_order *

DEF procedure check_pos

LOCAL one%:LOCAL two%:LOCAL row$:LOCAL col$:LOCAL temp$
temp$ = r%(pos):  temp$: row$ = temp$
temp$ = c%(pos):  temp$: col$ = temp$
ok% = 0: REMark ** Set to 1 if pair adjacent **
IF two% - one% - 2 THEN ok% = 1
IF two% = one% + 2 THEN ok% = 1
END Define

DEF procedure backtrack
LOCAL find/$:LOCAL temp/$(2):LOCAL max
fnd$/ = 0
REPeat search
row$/ = row$ - 1
FOR 1 = 1 TO size$,
  IF tree/.U,depth/.) = row$ THEN fnd$/ = 1
END FOR 1
IF fnd$/ THEN EXIT search
END REPeat search
max = 0: temp$$(1) = r$$(pos): temp$$(2) = c$$(pos)
FOR m = 1 TO 2
  FOR 1 = 1 TO size$,
    IF tree/.U, depth/.) = row$ THEN
      IF copy_gridmap(temp$$(m), 1) > max AND copy_gridmap(temp$$(m), 1)
      THEN max = copy_gridmap(temp$$(m), 1)
      END IF
    END IF
  END FOR 1
END FOR m
IF max = 0 THEN max = copy_gridmap(r%/(pos - 1),c%/(pos - 1))
END IF
level(lev$) = max
END IF
END IF
END FOR 1
END FOR m
IF max = 0 THEN max = copy_gridmap(r%/(pos - 1),c%/(pos - 1))
IF max < level(lev$)
IF copy_gridmap(r%/(pos-1),c%/(pos-1)) = max
lev = lev + 1
level(lev$) = max
ELSE

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15810  level(lev%) = max
15820  END IF
15830  END IF
15840  END DEFINE
Comparative Outputs from Shaw's FOCUS program and Gamble's MONOCLE program

An Output from FOCUS

<table>
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<tr>
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<td>40 23</td>
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<tr>
<td>71 22</td>
</tr>
<tr>
<td>81 17</td>
</tr>
<tr>
<td>90 10</td>
</tr>
</tbody>
</table>

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Comparative Outputs from Shaw’s FOCUS program
and Gamble’s MONOCLE program

An Output from MONOCLE

Cluster Presentation of Grid Image of Austria

(C) P.R. Gamble 1984
Full Monocle Analysis for Subject 1

**MONOCLE**

**Raw Grid Data**
Subject 1 - 03.85

<table>
<thead>
<tr>
<th>8 Constructs</th>
<th>10 Elements</th>
<th>Scale 1 to 7</th>
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<tr>
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<td></td>
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<tr>
<td>3) 7 7 1 6 6 7 1 4 7 6</td>
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<tr>
<td>4) 1 4 7 1 1 7 4 7 7 1</td>
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<tr>
<td>5) 1 4 4 1 1 1 4 7 7 1</td>
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<tr>
<td>6) 1 1 7 2 7 1 1 2 2 1</td>
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<td></td>
</tr>
<tr>
<td>7) 1 1 1 1 7 1 1 1 1 1</td>
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<td></td>
</tr>
<tr>
<td>8) 1 1 1 4 4 1 2 1 4</td>
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</tr>
</tbody>
</table>

Construct names

- I use
- Rely lot
- No rely
- Finished
- Recheck
- Consider
- On spot
- Job probs
- Personal
- Lifeline
- Not used
- Like
- Dislike
- Trust
- Not trust

Element names

- Dept. heads report
- Comp. bureau reports
- Calculator
- Discussion/meeting
- Architectural plans
- Telephone
- Computer
- Open hour
- One:one meetings
- Telex

**CONSTRUCT MATCHING SCORES**
Subject 1 - 03.85
The UPPER RIGHT half shows construct scores
The LOWER LEFT the reversed construct scores

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</table>

P.R. Gamble
Construct 3 reversed.

Join 2 and 6 to make cluster 9 at 93.33 %
Join 9 and 7 to make cluster 10 at 70 %
Join 4 and 5 to make cluster 11 at 70 %
Join 10 and 8 to make cluster 12 at 66.67 %
Join 3 and 12 to make cluster 13 at 50 %
Join 1 and 11 to make cluster 14 at 20 %
Join 14 and 13 to make cluster 15 at 20 %

**ELEMENT MATCHING SCORES**

Subject 1 – 03.95
Note: Elements are single items.
Thus the matrix is symmetrical.

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Join 1 and 4 to make cluster 11 at 91.67 %
Join 8 and 9 to make cluster 12 at 89.58 %
Join 6 and 10 to make cluster 13 at 85.42 %
Join 11 and 13 to make cluster 14 at 79.17 %
Join 2 and 14 to make cluster 15 at 79.17 %
Join 15 and 7 to make cluster 16 at 75 %
Join 16 and 12 to make cluster 17 at 68.75 %
Join 17 and 5 to make cluster 18 at 58.33 %
Join 3 and 18 to make cluster 19 at 50 %

P.R. Gamble
Full Monocle Analysis for Subject 2

**Computers and Innovation in the Hospitality Industry**

**Appendix 5**

---

**MUNULL: Raw Grid Data**

Subject 2 - 03.85

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Elements</th>
<th>Scale 1 to 7</th>
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</table>

**Construct names**

**Strong Im:** Talk you, Precise, Mind, Construct 5.

**Weak Im:** Telephone, Meetings many staff, Meetings many guests, Meet one on one, Calculator.

**Time imp.:** Express me, Periodic, Like.

**Time unim:** Not conf., Pass data, Not pers.

**Confidential:** Like, Precision, Day / day.

**Talks you:** Voice, Mind.

**Exress me:** Dislike, Element names.

---

**CONSTRUCT MATCHING SCORES**

Subject 2 - 03.85

The UPPER RIGHT half shows construct scores

The LOWER LEFT the reversed construct scores

| &nbsp; | 1 | &nbsp; | 2 | &nbsp; | 3 | &nbsp; | 4 | &nbsp; | 5 | &nbsp; | 6 | &nbsp; | 7 | &nbsp; | 8 | &nbsp; | 9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 23 | 3 | 3 | 57 | -17 | 43 | -37 | 23 |
| 2 | -23 | 0 | 40 | 40 | 0 | 20 | 20 | -20 |
| 3 | -3 | 0 | -20 | -20 | 60 | 0 | -40 | -40 |
| 4 | -3 | -40 | 20 | 20 | -20 | 40 | 0 | 0 |
| 5 | -57 | -40 | 20 | -20 | -60 | 40 | -40 | 40 |
| 6 | 17 | 0 | -60 | 20 | 60 | 0 | 0 | -40 |
| 7 | -43 | -20 | 0 | -40 | -40 | 0 | -20 | 20 |
| 8 | 37 | -20 | 40 | 0 | 40 | 0 | 20 | -20 |
| 9 | -23 | 20 | 40 | 0 | -40 | 40 | -20 | 20 |

Construct 5 reversed.

Construct 3 reversed.

Construct 2 reversed.

---

P.R. Gamble
Full Monocle Analysis for Subject 2

Join 3 and 6 to make cluster 10 at 60 %
Join 5 and 10 to make cluster 11 at 60 %
Join 1 and 11 to make cluster 12 at 56.67 %
Join 12 and 7 to make cluster 13 at 43.33 %
Join 2 and 4 to make cluster 14 at 40 %
Join 13 and 8 to make cluster 15 at 40 %
Join 14 and 15 to make cluster 16 at 40 %
Join 16 and 9 to make cluster 17 at 20 %

ELEMENT MATCHING SCORES
Subject 2 — 03.85
Note: Elements are single items.
Thus the matrix is symmetrical.

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<thead>
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Join 7 and 9 to make cluster 11 at 79.63 %
Join 6 and 10 to make cluster 12 at 70.37 %
Join 1 and 2 to make cluster 13 at 66.67 %
Join 5 and 12 to make cluster 14 at 66.67 %
Join 13 and 4 to make cluster 15 at 64.81 %
Join 3 and 15 to make cluster 16 at 64.81 %
Join 16 and 14 to make cluster 17 at 62.96 %
Join 17 and 8 to make cluster 18 at 61.11 %
Join 11 and 18 to make cluster 19 at 61.11 %
Full Monocle Analysis for Subject 2

Cluster Presentation of Grid

Subject 2 = 63.85

Mind 84
Not conf. 34
Precise 64
Not pers. 54
Strong Im 14
Day / day 74
Talks you 44
Time unia 24
Like 94

Voice = 8
Conf'tial# 3
Imprecise# 6
Exress im 5
Weak Im 1
Periodic 7
Pass data 4
Time imp 2
Dislike 9

(C) P.R. Gamble 1984
## MONOCLE Raw Grid Data

**Subject 3 - 03.85**

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### Construct names

- **Regular**
  - Use much
  - Record
  - Faster
  - Future
- **Irregular**
  - Forced
  - No record
  - Slower
  - Present
  - Focus
  - Un-focus

### Element names

- Dept. head meeting
- Special study report
- Committee meeting
- Financial report
- Consultant report
- Regular finance rep.
- Telephone
- Calculator
- Telexes
- Computer
- One:one meeting

### CONSTRUCT MATCHING SCORES

**Subject 3 - 03.85**
The UPPER RIGHT half shows construct scores
The LOWER LEFT the reversed construct scores

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Join 5 and 6 to make cluster 7 at 81.82 %
Join 4 and 7 to make cluster 8 at 72.73 %
Join 1 and 2 to make cluster 9 at 68.18 %
Join 3 and 8 to make cluster 10 at 45.45 %
Join 9 and 10 to make cluster 11 at 27.27 %
### Full Monocle Analysis for Subject 3

**Element: Matching Scores**

**Subject 3 - 03.85**

Note: Elements are single items. Thus the matrix is symmetrical.

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Join 2 and 3 to make cluster 12 at 100%
Join 12 and 4 to make cluster 13 at 100%
Join 13 and 5 to make cluster 14 at 95.83%
Join 1 and 9 to make cluster 15 at 91.67%
Join 6 and 15 to make cluster 16 at 91.67%
Join 14 and 10 to make cluster 17 at 85.33%
Join 7 and 8 to make cluster 18 at 79.17%
Join 18 and 11 to make cluster 19 at 79.17%
Join 16 and 19 to make cluster 20 at 75%
Join 17 and 20 to make cluster 21 at 70.83%
Full Monocle Analysis for Subject 3

Cluster Presentation of Grid

Subject 3 = 03.85

---

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---

P.R. Gamble

Page 628
Full Monocle Analysis for Subject 4

### MONOCLE

#### Raw Grid Data

Subject 4 - 08.85

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#### Construct names

- General
- Specific
- Static
- Dynamic
- Imm. feed
- Slow feed
- Efficient
- Ineffict.
- Feeling
- Impersnl
- Informs
- Manipulat
- Calculate
- Communicate
- Specialist
- Self

#### Element names

- Outside Professional
- Consult HOD 1:1
- Consult HOD in group
- Statistical report
- Filed records
- Personal computer
- Calculator
- Telephone
- Personal opinion
- Intercom
- Telex
- Computer simulation

### CONSTRUCT MATCHING SCORES

Subject 4 - 08.85

The UPPER RIGHT half shows construct scores

The LOWER LEFT the reversed construct scores

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P.R. Gamble
Construct 3 reversed.
Construct 2 reversed.
Construct 4 reversed.
Construct 6 reversed.
Construct 5 reversed.

Join 3 and 6 to make cluster 9 at 87.5 %
Join 2 and 9 to make cluster 10 at 75 %
Join 10 and 8 to make cluster 11 at 66.67 %
Join 4 and 11 to make cluster 12 at 66.67 %
Join 1 and 12 to make cluster 13 at 62.5 %
Join 13 and 7 to make cluster 14 at 50.33 %
Join 5 and 14 to make cluster 15 at 29.17 %

ELEMENT MATCHING SCORES
Subject 4 - 08.85

Note: Elements are single items.
Thus the matrix is symmetrical.

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Join 8 and 10 to make cluster 13 at 100 %
Join 2 and 9 to make cluster 14 at 87.5 %
Join 6 and 12 to make cluster 15 at 87.5 %
Join 1 and 14 to make cluster 16 at 84.38 %
Join 4 and 5 to make cluster 17 at 84.38 %
Join 3 and 13 to make cluster 18 at 78.13 %
Join 16 and 7 to make cluster 19 at 75 %
Join 19 and 11 to make cluster 20 at 75 %
Join 15 and 20 to make cluster 21 at 71.08 %
Join 18 and 21 to make cluster 22 at 71.88 %
Join 22 and 17 to make cluster 23 at 53.13 %
Cluster Presentation of Grid Subject 4 - Ø8.85
**Full Monocle Analysis for Subject 5**

**MONOCLE**

**Raw Grid Data**

Subject 5 - 08.85

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**Construct names**

Objective Subjectiv
Written Diagram
Calculate Not calc.
Own Exp. Specialist
Depend me Not cont.
1 way 2 way
Can tell No tell
Owns acts Formative
Tool Executive
Flexible Inflexible

**Element names**

Personal experience
HOD meeting 1:many
Meet staff 1:1
Group pressure
Statistical reports
Investigations/surve
Microcomputer
Calculator
Digital telephone
Telex
Facsimile machine
Copier

**CONSTRUCT MATCHING SCORES**

Subject 5 - 08.85

The LOWER LEFT the reversed construct scores

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P.R. Gamble
Full Monocle Analysis for Subject 5

Join 1 and 8 to make cluster 11 at 83.33%
Join 11 and 6 to make cluster 12 at 79.17%
Join 4 and 7 to make cluster 13 at 66.67%
Join 13 and 10 to make cluster 14 at 62.5%
Join 5 and 14 to make cluster 15 at 58.33%
Join 3 and 15 to make cluster 16 at 54.17%
Join 2 and 16 to make cluster 17 at 50%
Join 17 and 9 to make cluster 18 at 33.33%
Join 12 and 18 to make cluster 19 at 29%

ELEMENT MATCHING SCORES
Subject 5 - 98.85
Note: Elements are single items.
Thus the matrix is symmetrical.

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Join 1 and 4 to make cluster 17 at 82.5%
Join 2 and 6 to make cluster 18 at 80%
Join 10 and 18 to make cluster 19 at 80%
Join 5 and 5 to make cluster 20 at 75%
Join 17 and 16 to make cluster 21 at 65%
Join 17 and 21 to make cluster 22 at 62.5%
Join 20 and 22 to make cluster 23 at 52.5%
Cluster Presentation of Grid
Subject 5 – 28.85

(C) P.R. Gamble 1984

P.R. Gamble
Full Monocle Analysis for Subject 6

**MONOCLE**

**Raw Grid Data**
Subject 6 - 08.85

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**Construct names**

- Don't use
- Use a lot
- Sophisticed
- Unsophisticated
- Instructs
- Dialogue
- Flexible
- Inflexible
- Individ
- Group
- Prod info
- Disp info
- People
- Business
- Figures
- Statistic

**Element names**

- Statistical report
- Discussion staff 1:1
- Personal judgement
- Computer report
- Large computer (NCR)
- Personal computer
- Telephone
- Calculator
- Regular HOD meeting
- Revenue report

**CONSTRUCT MATCHING SCORES**
Subject 6 - 08.85

The UPPER RIGHT half shows construct scores
The LOWER LEFT the reversed construct scores

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Construct 7 reversed.
Construct 6 reversed.
Construct 2 reversed.
Construct 3 reversed.

P.R. Gamble
**Full Monocle Analysis for Subject 6**

Join 7 and 8 to make cluster 9 at 80%
Join 1 and 2 to make cluster 10 at 65%
Join 6 and 9 to make cluster 11 at 60%
Join 10 and 4 to make cluster 12 at 45%
Join 12 and 11 to make cluster 13 at 40%
Join 3 and 5 to make cluster 14 at 40%
Join 14 and 13 to make cluster 15 at 30%

**ELEMENT MATCHING SCORES**

Subject 6 - 98.85

Note: Elements are single items.
Thus the matrix is symmetrical.

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Join 7 and 8 to make cluster 11 at 90.63%
Join 2 and 3 to make cluster 12 at 87.5%
Join 4 and 10 to make cluster 13 at 87.5%
Join 1 and 5 to make cluster 14 at 84.38%
Join 13 and 14 to make cluster 15 at 78.13%
Join 12 and 9 to make cluster 16 at 68.35%
Join 11 and 15 to make cluster 17 at 68.75%
Join 17 and 6 to make cluster 18 at 65.63%
Join 18 and 16 to make cluster 19 at 65.63%
Full Monocle Analysis for Subject 6

Cluster Presentation of Grid
Subject 6 - 88.85

Business 7 5 5 5 3 3 1 1 1 1
Figures 8 5 3 3 3 3 1 1 1 1
Disp info 6 3 3 3 5 5 1 1 1 1
Unsophist 2 3 3 3 1 1 2 2 2 2 5
Don't use 1 4 4 2 5 4 5 4 3 1
Flexible 4 5 3 3 5 5 5 1 3 5
Dialogue 3 5 1 1 5 5 3 3 1 3
Individ 5 5 3 1 1 1 3 3 5 5 3

(C) P. R. Gamble 1984
Full Monocle Analysis for Subject 7

**MONOCLE**

**Raw Grid Data**

Subject 7 - 02.05

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<th>9 Constructs</th>
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<th>Scale 1 to 7</th>
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</table>

Construct names

1 to 1 1 to many
Fast Slow
Essential Desirable
Outside By staff
Means Ends
Unsecret Secret
Concise Laborious
Messages No msg.
Persuades Informs

Element names

Telex
Telephone
Wage cards
Calculator
Meetings
Files
Statistical reports
Remote database
Computer
Statistical forecast

**CONSTRUCT MATCHING SCORES**

Subject 7 - 02.05

The UPPER RIGHT half shows construct scores
The LOWER LEFT the reversed construct scores

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</table>
Construct 3 reversed.
Construct 1 reversed.

Join 2 and 4 to make cluster 10 at 78%.
Join 3 and 6 to make cluster 11 at 78%.
Join 10 and 7 to make cluster 12 at 66.67%.
Join 12 and 8 to make cluster 13 at 60%.
Join 11 and 9 to make cluster 14 at 56.67%.
Join 13 and 5 to make cluster 15 at 53.33%.
Join 1 and 14 to make cluster 16 at 46.67%.
Join 15 and 16 to make cluster 17 at 46.67%.

**ELEMENT MATCHING SCORES**
**Subject 7 — 92.85**
Note: Elements are single items.
Thus the matrix is symmetrical.

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</table>

Join 3 and 6 to make cluster 11 at 98.15%.
Join 1 and 2 to make cluster 12 at 88.09%.
Join 9 and 10 to make cluster 13 at 85.19%.
Join 12 and 10 to make cluster 14 at 81.48%.
Join 9 and 14 to make cluster 15 at 77.78%.
Join 15 and 4 to make cluster 16 at 72.22%.
Join 7 and 16 to make cluster 17 at 72.22%.
Join 9 and 17 to make cluster 18 at 70.37%.
Join 11 and 18 to make cluster 19 at 48.15%.
Cluster Presentation of Grid
Subject 7 - 02.85

Persuades 9
Desirable 3
Unsecret 6
1 to many 1
Messages 8
Concise 7
Fast 2
Outside 4
Means 5

Informs 9
Essential 3
Secret 6
1 to 1 1
No mess. 0
Laborious 7
Slow 2
By staff 4
Ends 5

(C) P.R. Gamble 1984
### MONOCLE

**Raw Grid Data**

Subject 8 - 12.85

12 Constructs 12 Elements Scale 1 to 5

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### Construct Matching Scores

Subject 8 - 12.85

The UPPER RIGHT half shows construct scores
The LOWER LEFT the reversed construct scores

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P.R. Gamble
Full Monocle Analysis for Subject 8

Construct 2 reversed.
Construct 5 reversed.
Construct 9 reversed.

Join 1 and 3 to make cluster 13 at 82.53 %
Join 2 and 13 to make cluster 14 at 79.17 %
Join 14 and 4 to make cluster 15 at 78.83 %
Join 6 and 11 to make cluster 16 at 62.5 %
Join 5 and 16 to make cluster 17 at 59.53 %
Join 9 and 10 to make cluster 18 at 58.33 %
Join 7 and 8 to make cluster 19 at 56 %
Join 17 and 12 to make cluster 20 at 45.87 %
Join 15 and 20 to make cluster 21 at 41.67 %
Join 18 and 21 to make cluster 22 at 41.67 %
Join 20 and 6 to make cluster 23 at 41.67 %
Join 19 and 22 to make cluster 24 at 39.17 %
Join 9 and 12 to make cluster 25 at 35.83 %
Join 7 and 15 to make cluster 26 at 35.42 %
Join 8 and 16 to make cluster 27 at 34.92 %
Join 21 and 17 to make cluster 28 at 30.25 %
Join 17 and 28 to make cluster 29 at 29.87 %

**ELEMENT MATCHING SCORES**
Subject 8 - 12.85

Note: Elements are single items.
Thus the matrix is symmetrical.

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Join 1 and 3 to make cluster 13 at 91.67 %
Join 9 and 12 to make cluster 14 at 87.5 %
Join 14 and 4 to make cluster 15 at 85.33 %
Join 6 and 11 to make cluster 16 at 81.25 %
Join 5 and 16 to make cluster 17 at 81.25 %
Join 17 and 15 to make cluster 18 at 81.17 %
Join 2 and 13 to make cluster 19 at 79.17 %
Join 10 and 4 to make cluster 20 at 72.92 %
Join 18 and 6 to make cluster 21 at 72.92 %
Join 21 and 17 to make cluster 22 at 56.25 %
Join 17 and 22 to make cluster 23 at 70.87 % (join two main clusters)

P.R. Gamble
Page 642
Full Monocle Analysis for Subject 8

Cluster Presentation of Grid
Subject 8 - 12.85

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### Full Monocle Analysis for Subject 9

#### Raw Grid Data

**Subject 9 - 02.85**

<table>
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<tr>
<th>12 Constructs</th>
<th>9 Elements</th>
<th>Scale 1 to 5</th>
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<td>12) 1 1 1 1 5 1 1 5 1</td>
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#### Construct names

- Developed
- Undeveloped
- Energy In
- Energy Eff
- Unhelpful
- Helpful
- No Future
- Future
- Not reach
- Research
- Automatic
- Manual
- Sales Aid
- Not sales
- Easy use
- Hard use
- Study out
- Blame
- Like
- Dislike
- Use often
- Not used
- Permanent
- Temporary

#### Element names

- Word processor
- Point of Sale
- Till
- C.C.T.V.
- Convection oven
- Catering Inf. System
- Spectrum computer
- Bolling range
- Calculator
- Telephone

#### Construct Matching Scores

**Subject 9 - 02.85**

The UPPER RIGHT half shows construct scores

The LOWER LEFT the reversed construct scores

<table>
<thead>
<tr>
<th></th>
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</table>
Construct 4 reversed.
Construct 3 reversed.
Construct 2 reversed.
Construct 5 reversed.
Construct 8 reversed.

Join 4 and 5 to make cluster 13 at 94.44 %
Join 1 and 6 to make cluster 14 at 88.89 %
Join 13 and 7 to make cluster 15 at 88.89 %
Join 3 and 10 to make cluster 16 at 72.22 %
Join 16 and 11 to make cluster 17 at 72.22 %
Join 14 and 12 to make cluster 18 at 61.11 %
Join 2 and 10 to make cluster 19 at 61.11 %
Join 7 and 17 to make cluster 20 at 61.11 %
Join 15 and 20 to make cluster 21 at 44.44 %
Join 19 and 8 to make cluster 22 at 38.89 %
Join 22 and 21 to make cluster 23 at 38.89 %

ELEMENT MATCHING SCORES
Subject 9 - 02.85
Note: Elements are single items.
Thus the matrix is symmetrical.

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</table>

Join 4 and 7 to make cluster 10 at 89.58 %
Join 2 and 5 to make cluster 11 at 85.42 %
Join 3 and 6 to make cluster 12 at 85.42 %
Join 1 and 11 to make cluster 13 at 79.17 %
Join 13 and 9 to make cluster 14 at 79.17 %
Join 14 and 12 to make cluster 15 at 79.17 %
Join 8 and 15 to make cluster 16 at 75 %
Join 10 and 16 to make cluster 17 at 62.5 %

P.R. Gamble
Cluster Presentation of Grid Subject 9 - 82.85
Example of a Training Aid for a Hotel Computer System (Cont.)
Example of a Training Aid for a Hotel Computer System (Cont.)
Survey Form Used for Sampling the Membership of the Hotel, Catering and Institutional Management Association

Dear Professional,

At some time or another most people in the hospitality industry need to conduct a survey. It might be designed to find out whether guests or customers are satisfied, to discover whether the advertising is working or to convey the views of staff. They all need to start with a plan to respondents asking for their help and co-operation. This survey is no different. Please help! I know it is aimed at a busy group of people, professional managers and supervisors in the hospitality industry, but I do hope you can spare a few minutes one evening to fill it in and mail it. The results will be published and should provide some valuable information to all those concerned with applying computer technology to our industry. Many thanks for your contribution - Paul Halsey.

Please provide some general information about your business.

<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
<th>Yes</th>
<th>No</th>
<th>Unsure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you own all or part of the business?</td>
<td>[ ]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are you part of a chain or group?</td>
<td>[ ]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How many people are employed in the hospitality unit in which you work?</td>
<td>[ ]</td>
<td></td>
<td></td>
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</tbody>
</table>

Please tell me if you think information technology (IT) is important to you.

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<th>Options</th>
<th>Yes</th>
<th>No</th>
<th>Unsure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you believe that IT could help you to do your job better?</td>
<td>[ ]</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

Please tell me about your aspirations of using computers.

<table>
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<th>Question</th>
<th>Options</th>
<th>Yes</th>
<th>No</th>
<th>Unsure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Were you over-trained to use a computer?</td>
<td>[ ]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can you use a computer?</td>
<td>[ ]</td>
<td></td>
<td></td>
<td></td>
</tr>
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</table>

How many computers do you have in your particular department/s?

<table>
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<tr>
<th>Question</th>
<th>Options</th>
<th>Yes</th>
<th>No</th>
<th>Unsure</th>
</tr>
</thead>
<tbody>
<tr>
<td>How much other equipment do you have in your department/s?</td>
<td>[ ]</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please rate your impressions of service from the computer industry.

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<th>Good</th>
<th>Sound</th>
<th>Neutral</th>
<th>Poor</th>
<th>Very Poor</th>
<th>Abysmal</th>
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<tr>
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<td></td>
<td></td>
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<td></td>
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<tr>
<td>Reliability of systems</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Reliability of printers</td>
<td>[ ]</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Cost of hardware maintenance</td>
<td>[ ]</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Cost of software maintenance</td>
<td>[ ]</td>
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<td></td>
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<tr>
<td>Value for money of software</td>
<td>[ ]</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Software meets expectations</td>
<td>[ ]</td>
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<td></td>
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<tr>
<td>Ease with which software is changed</td>
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<tr>
<td>Training from suppliers/dealers</td>
<td>[ ]</td>
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</tbody>
</table>

P.R. Gamble
Survey Form Used for Sampling the Membership of the Hotel, Catering and Institutional Management Association

## PAGE 2

### Appendix 7

**BCIHfl Computer and Technology Survey**

6. **Where do you use computer based procedures for administration?**

<table>
<thead>
<tr>
<th>Option</th>
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<th>No</th>
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<td>Office use only</td>
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<td>31</td>
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<tr>
<td>Other</td>
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</table>

7. **How do you mainly employ a computer in your job?**

<table>
<thead>
<tr>
<th>Option</th>
<th>Yes</th>
<th>No</th>
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<tr>
<td>dedication system</td>
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<tr>
<td>Terminal to in-house computer</td>
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<td>31</td>
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<tr>
<td>Terminal to company computer</td>
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<td>31</td>
</tr>
<tr>
<td>Batch use of company computer</td>
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<td>31</td>
</tr>
<tr>
<td>Regular use of a bureau</td>
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<td>31</td>
</tr>
<tr>
<td>Other</td>
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</tr>
</tbody>
</table>

8. **Do you have the use of a microcomputer at work?**

- Yes [ ]  No [ ]
- If the answer is NO please skip to section 9.

8.2 **Which of the following business programs do you use?**

<table>
<thead>
<tr>
<th>Program</th>
<th>Count</th>
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<tbody>
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<td>Word Processor</td>
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<tr>
<td>Spreadsheet package</td>
<td>32</td>
</tr>
<tr>
<td>Database Manager</td>
<td>32</td>
</tr>
<tr>
<td>Accounting</td>
<td>32</td>
</tr>
<tr>
<td>Financial Accounting</td>
<td>32</td>
</tr>
<tr>
<td>Sales, Marketing</td>
<td>32</td>
</tr>
<tr>
<td>Other</td>
<td>32</td>
</tr>
</tbody>
</table>

9. **Please tick a box for each computer application used by your unit in the table below. If you use a manual procedure, please indicate if you intend to consider a computer procedure.**

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<th>Application</th>
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<td>Reservations</td>
<td>32</td>
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<tr>
<td>Registration</td>
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</tr>
<tr>
<td>Billing</td>
<td>32</td>
</tr>
<tr>
<td>Other</td>
<td>32</td>
</tr>
<tr>
<td>FOOD &amp; BEVERAGE</td>
<td>32</td>
</tr>
<tr>
<td>Stock taking only</td>
<td>32</td>
</tr>
<tr>
<td>Computer controlled</td>
<td>32</td>
</tr>
<tr>
<td>Beverage control</td>
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</tr>
<tr>
<td>Sales orders</td>
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</tr>
<tr>
<td>Other</td>
<td>32</td>
</tr>
<tr>
<td>ACCOUNTING</td>
<td>32</td>
</tr>
<tr>
<td>Accounts Receivable</td>
<td>32</td>
</tr>
<tr>
<td>Accounts Payable</td>
<td>32</td>
</tr>
<tr>
<td>Payroll</td>
<td>32</td>
</tr>
<tr>
<td>Credit control</td>
<td>32</td>
</tr>
<tr>
<td>Other</td>
<td>32</td>
</tr>
<tr>
<td>SALES AND MARKETING</td>
<td>32</td>
</tr>
<tr>
<td>Guest History</td>
<td>32</td>
</tr>
<tr>
<td>Sales History</td>
<td>32</td>
</tr>
<tr>
<td>Sales Reports</td>
<td>32</td>
</tr>
<tr>
<td>Media Planning</td>
<td>32</td>
</tr>
<tr>
<td>Other</td>
<td>32</td>
</tr>
<tr>
<td>GENERAL MANAGEMENT</td>
<td>32</td>
</tr>
<tr>
<td>Budgeting</td>
<td>32</td>
</tr>
<tr>
<td>Management Accounting</td>
<td>32</td>
</tr>
<tr>
<td>Maintenance co-ord.</td>
<td>32</td>
</tr>
<tr>
<td>Housekeeping co-ord.</td>
<td>32</td>
</tr>
<tr>
<td>Reports/letters etc.</td>
<td>32</td>
</tr>
<tr>
<td>Project control</td>
<td>32</td>
</tr>
<tr>
<td>Personnel admin.</td>
<td>32</td>
</tr>
<tr>
<td>Purchasing</td>
<td>32</td>
</tr>
</tbody>
</table>

10. **Please tick a box if you use any of the following applications.**

- Microcomputers for hire to guests [ ]
- Computer monitored vending [ ]
- Electronic cash registers (ECRs) linked to each other [ ]
- Electronic door locking systems [ ]
- In-room entertainment [ ]
- Microcomputers controlled by a computer [ ]
- In-room telephonic systems [ ]
- Noise control systems [ ]
- Light control systems [ ]
- Automatic wake up systems [ ]
- In-room entertainment [ ]
- Office systems in guest rooms [ ]
- Office systems in guest rooms [ ]

11. **Who would initiate a proposal to install computer based systems in your unit?**

- I would [ ]
- Someone else in my department [ ]
- My boss [ ]
- Another department in my company [ ]
- Head office [ ]
- Don't know [ ]

12. **Who would analyze needs and recommend requirements for computer systems?**

- I would [ ]
- Someone else in my department [ ]
- My boss [ ]
- Another department in my company [ ]
- Head office [ ]
- Outside consultant / contractor [ ]
- Don't know [ ]

13. **Have you ever had to replace or remove a computer system due to its poor performance?**

- Yes [ ]
- No [ ]

14. **Have you ever wanted to remove or replace a system but been unable to do so?**

- Yes [ ]
- No [ ]

P.R. Gamble
### Survey Form Used for Sampling the Membership of the Hotel, Catering and Institutional Management Association

#### PAGE 3

**ECCHM Computer and Technology Survey**

15. What do you feel about computers and computer based systems? Please make one tick on each line, towards the word that describes the strength of your feelings about computers.

<table>
<thead>
<tr>
<th>Extremely Positive</th>
<th>Mostly Positive</th>
<th>Slightly Positive</th>
<th>Neutral</th>
<th>Slightly Negative</th>
<th>Mostly Negative</th>
<th>Extremely Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bull</td>
<td>Unacceptable</td>
<td>Unenjoyable</td>
<td>Dislike</td>
<td>Unenjoyable</td>
<td>Unenjoyable</td>
<td>Dislike</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
</tr>
</tbody>
</table>

- Predictable
- Easy
- Personnalising
- Complex
- Weak

<table>
<thead>
<tr>
<th>Formal</th>
<th>Organised</th>
<th>Boring</th>
<th>Demanding</th>
<th>Intelligent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stimulating</td>
<td>Adaptable</td>
<td>Routine</td>
<td>Conventional</td>
<td>Powerfull</td>
</tr>
<tr>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
</tr>
</tbody>
</table>

- Co-operative
- Circus
- Irresponsible
- Personalising
- Patient

<table>
<thead>
<tr>
<th>Systematic</th>
<th>Dependable</th>
<th>Flexible</th>
<th>Distrusting</th>
<th>Threatening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predictable</td>
<td>Adaptable</td>
<td>Conventional</td>
<td>Powerfull</td>
<td>20</td>
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<tr>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
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</tbody>
</table>

- Tryworthy
- Challenging
- Clear
- Effective

<table>
<thead>
<tr>
<th>Infallible</th>
<th>Personal</th>
<th>Sexy</th>
<th>Dominant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unpredictable</td>
<td>Unpersonal</td>
<td>Unenjoyable</td>
<td>Unattractive</td>
</tr>
<tr>
<td>26</td>
<td>27</td>
<td>28</td>
<td>29</td>
</tr>
</tbody>
</table>

- Efficient
- Enjoyable
- Fast
- Humanising

<table>
<thead>
<tr>
<th>Reliable</th>
<th>Friendly</th>
<th>Refreshing</th>
<th>Encouraging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unreliable</td>
<td>Unenjoyable</td>
<td>Unattractive</td>
<td>Discouraging</td>
</tr>
<tr>
<td>30</td>
<td>31</td>
<td>32</td>
<td>33</td>
</tr>
</tbody>
</table>

16. Please tick a box to express your views about the following statements.

*** Computers can simplify complex problems.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Slightly Agree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>(     )</td>
<td>(             )</td>
<td>(         )</td>
<td>(                 )</td>
<td>(         )</td>
<td>(                 )</td>
</tr>
</tbody>
</table>

*** Computers' capabilities for speed are often overestimated.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Slightly Agree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
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<tbody>
<tr>
<td>51</td>
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<td>(             )</td>
<td>(         )</td>
<td>(                 )</td>
<td>(         )</td>
<td>(                 )</td>
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</tbody>
</table>

*** To use a computer you must learn a special computer language.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Slightly Agree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>52</td>
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<td>(             )</td>
<td>(         )</td>
<td>(                 )</td>
<td>(         )</td>
<td>(                 )</td>
</tr>
</tbody>
</table>

*** My subordinates would not co-operate with a computer based system.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Slightly Agree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
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<td>53</td>
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<td>(             )</td>
<td>(         )</td>
<td>(                 )</td>
<td>(         )</td>
<td>(                 )</td>
</tr>
</tbody>
</table>

*** The files on a computer can be wiped out unintentionally.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Slightly Agree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>54</td>
<td>(     )</td>
<td>(             )</td>
<td>(         )</td>
<td>(                 )</td>
<td>(         )</td>
<td>(                 )</td>
</tr>
</tbody>
</table>

*** Society relies too heavily on computers.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Slightly Agree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>55</td>
<td>(     )</td>
<td>(             )</td>
<td>(         )</td>
<td>(                 )</td>
<td>(         )</td>
<td>(                 )</td>
</tr>
</tbody>
</table>

*** Most hotel guests think that computers make hotels efficient.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Slightly Agree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>56</td>
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<td>(             )</td>
<td>(         )</td>
<td>(                 )</td>
<td>(         )</td>
<td>(                 )</td>
</tr>
</tbody>
</table>

*** More computers would be helpful to me in my work.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Slightly Agree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
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<td>(             )</td>
<td>(         )</td>
<td>(                 )</td>
<td>(         )</td>
<td>(                 )</td>
</tr>
</tbody>
</table>

*** It is easier to make silly mistakes when working with a computer.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Slightly Agree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>58</td>
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<td>(             )</td>
<td>(         )</td>
<td>(                 )</td>
<td>(         )</td>
<td>(                 )</td>
</tr>
</tbody>
</table>

*** It takes longer to train new people if computers are used.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Slightly Agree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>59</td>
<td>(     )</td>
<td>(             )</td>
<td>(         )</td>
<td>(                 )</td>
<td>(         )</td>
<td>(                 )</td>
</tr>
</tbody>
</table>

*** Computers do not use the language of the hospitality industry.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Slightly Agree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>(     )</td>
<td>(             )</td>
<td>(         )</td>
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<td>(         )</td>
<td>(                 )</td>
</tr>
</tbody>
</table>
### Computer and Technology Survey

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly Agree</th>
<th>Slightly Agree</th>
<th>Neutral</th>
<th>Slightly Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>My boss does not believe that computers will improve business performance.</td>
<td>Strongly Agree</td>
<td>Slightly Agree</td>
<td>Neutral</td>
<td>Slightly Disagree</td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>It is harder to make changes to procedures when computers are used.</td>
<td>Strongly Agree</td>
<td>Slightly Agree</td>
<td>Neutral</td>
<td>Slightly Disagree</td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>The monetary benefits of computers more than offset their disadvantages.</td>
<td>Strongly Agree</td>
<td>Slightly Agree</td>
<td>Neutral</td>
<td>Slightly Disagree</td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>Computers should be used mostly by secretaries and clerks.</td>
<td>Strongly Agree</td>
<td>Slightly Agree</td>
<td>Neutral</td>
<td>Slightly Disagree</td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>The decisions that I make are too complicated for a computer.</td>
<td>Strongly Agree</td>
<td>Slightly Agree</td>
<td>Neutral</td>
<td>Slightly Disagree</td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>Short of physical violence you cannot damage a computer.</td>
<td>Strongly Agree</td>
<td>Slightly Agree</td>
<td>Neutral</td>
<td>Slightly Disagree</td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>Hotel and catering managers should be trained more in the use of computers.</td>
<td>Strongly Agree</td>
<td>Slightly Agree</td>
<td>Neutral</td>
<td>Slightly Disagree</td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>The limitations of using computers lie in managers, not in the machines.</td>
<td>Strongly Agree</td>
<td>Slightly Agree</td>
<td>Neutral</td>
<td>Slightly Disagree</td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>Computers will make jobs in the hospitality industry less interesting.</td>
<td>Strongly Agree</td>
<td>Slightly Agree</td>
<td>Neutral</td>
<td>Slightly Disagree</td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>Computers save a lot of time.</td>
<td>Strongly Agree</td>
<td>Slightly Agree</td>
<td>Neutral</td>
<td>Slightly Disagree</td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>The use of a computer would make my job more enjoyable.</td>
<td>Strongly Agree</td>
<td>Slightly Agree</td>
<td>Neutral</td>
<td>Slightly Disagree</td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>Computers may cost some people in my company their jobs.</td>
<td>Strongly Agree</td>
<td>Slightly Agree</td>
<td>Neutral</td>
<td>Slightly Disagree</td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>Companies which use computers are more efficient.</td>
<td>Strongly Agree</td>
<td>Slightly Agree</td>
<td>Neutral</td>
<td>Slightly Disagree</td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>Computers will gradually take over more management jobs in my industry.</td>
<td>Strongly Agree</td>
<td>Slightly Agree</td>
<td>Neutral</td>
<td>Slightly Disagree</td>
<td>Strongly Disagree</td>
</tr>
</tbody>
</table>

And finally a few personal questions (quite anonymously answered!).

17. Please tell us a little about yourself.

17.1 Are you male [ ] or female [ ]?
17.2 Age group: [ ] less than 20 [ ] 20-29 [ ] 30-39 [ ] 40-49 [ ] 50 or over [ ]
17.3 What sort of job do you do?
   General management
   Department manager
   Supervisor or Inst. Manager
   Clerical/secretarial
   Operative (kitchen/bar etc.)
   Trainee
   Others
17.4 In what sort of area?
   General
   Rooms
   Food & Beverage
   Marketing/sales
   Accounting
   Purchasing
   Other

17.5 What is your latest qualification?
   Postgraduate degree or diploma
   Bachelors in Management Studies (BMS)
   Diploma or Certificate
   Ord. Diploma or Certificate
   Professional Qualification
   Craft Certification
   Other/None of these
17.6 In which major subject?
   Hotel & catering management
   Business management
   Computing
   Marketing/sales
   Accounting
   Purchasing
   Other

17.7 Do you belong to...?
   The CIHMA
   The ICA
   The BCA
   Bank
   Other
   None of these
17.8 In what capacity?
   Fellow
   Member
   Associate
   Bank
   Other
   None of these

18. Are you a member of a trade union?
   Yes [ ] No [ ]

Thank you again for taking time to participate in this survey, please enclose the form in the reply paid envelope and drop it in the post.

Paul R. Gamble
### Full Monocle Analysis for Subject 10

#### MONOCLE

**Raw Grid Data**  
Subject 10 - 04.86

<table>
<thead>
<tr>
<th>B Constructs</th>
<th>11 Elements</th>
<th>Scale 1 to 5</th>
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</thead>
<tbody>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>3) 2 4 2 3 1 2 1 2 4 1 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4) 3 4 3 4 1 3 1 2 3 1 4</td>
<td></td>
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<tr>
<td>5) 2 4 3 4 1 1 1 3 4 2 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6) 1 4 3 3 1 3 1 3 4 2 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7) 2 4 2 3 2 2 1 1 4 1 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8) 3 4 2 2 1 3 1 2 3 1 2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Construct names**

- Compiles
- Evaluates
- Structure
- Less stru
- Trusted
- Formative
- Asks answ
- Get info
- Status
- Direction
- End
- Processes
- Specific
- Not spec.
- Solicited
- Ad hoc

**Element names**

- Study reports
- External discussion
- Internal discussion
- Telephone
- Small computer
- One:one meeting
- Financial reports
- Mkt. Info. Analysis
- Files
- Calculators
- Street smarts

**CONSTRUCT MATCHING SCORES**  
Subject 10 - 04.86

The UPPER RIGHT half shows construct scores  
The LOWER LEFT the reversed construct scores

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
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<td>14</td>
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<td></td>
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</tbody>
</table>

Construct 1 reversed.

---

P.R. Gamble
Full Monocle Analysis for Subject 10

Join 2 and 3 to make cluster 9 at 86.36 %
Join 9 and 7 to make cluster 10 at 86.36 %
Join 10 and 4 to make cluster 11 at 81.82 %
Join 1 and 11 to make cluster 12 at 77.27 %
Join 5 and 6 to make cluster 13 at 77.27 %
Join 12 and 13 to make cluster 14 at 68.18 %
Join 14 and 8 to make cluster 15 at 68.18 %

ELEMENT MATCHING SCORES
Subject 10 — 04.86
Note: Elements are single items.
Thus the matrix is symmetrical.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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Join 5 and 7 to make cluster 12 at 96.88 %
Join 5 and 8 to make cluster 13 at 93.75 %
Join 2 and 9 to make cluster 14 at 90.63 %
Join 12 and 10 to make cluster 15 at 90.63 %
Join 14 and 11 to make cluster 16 at 84.38 %
Join 13 and 6 to make cluster 17 at 84.38 %
Join 4 and 16 to make cluster 18 at 84.38 %
Join 1 and 17 to make cluster 19 at 81.25 %
Join 19 and 15 to make cluster 20 at 81.25 %
Join 20 and 18 to make cluster 21 at 68.75 %
Full Monocle Analysis for Subject 10

Cluster Presentation of Grid
Subject 10 - 04.86

Status 5
End 6
Evaluates 1
Asks ans 4
Structure 1
Trusted 5
Specific 7
Solicited 8

Direction 5
Processes 6
Compiles 1
Get info 4
Less struc 2
Formative 3
Not spec 7
Ad hoc 8

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Full Monocle Analysis for Subject 11

MONOCLE

Raw Grid Data
Subject 11 - 04.86

7 Constructs 10 Elements Scale 1 to 5

1) 1 2 4 1 2 5 3 2 3 5
2) 1 1 3 3 5 1 3 2 3 1
3) 1 1 3 3 2 5 4 1 3 5
4) 3 5 3 2 1 3 3 5 5 3
5) 3 3 2 5 3 5 4 4 5 5
6) 1 1 3 4 4 5 3 3 1 5
7) 2 2 4 1 3 5 4 4 2 5

Construct names

By itself Linked
Needs tec Not spec
Use daily Intermitt
Individ. Standard
Judges Decides
Controls ID probm
Exchanges One way

Element names

Large computer
Small computer
Word processor
Team meeting
Personal judgement
Outside consult
Facsimile machine
Telephone
Financial report
Study report

CONSTRUCT MATCHING SCORES
Subject 11 - 04.86

The UPPER RIGHT half shows construct scores
The LOWER LEFT the reversed construct scores

* 1 2 3 4 5 6 7

1 25 70 5 25 50 70
2 * 35 35 -10 -10 35 5
3 * -20 35 -5 35 60 50
4 * 25 60 45 20 -15 5
5 * 25 40 -5 0 35 45
6 * 0 25 -10 65 5 50
7 * -10 35 -10 15 25 -10

Construct 4 reversed.
Construct 2 reversed.
Join 1 and 3 to make cluster 8 at 70%.
Joint 8 and 7 to make cluster 9 at 70%.
Join 4 and 6 to make cluster 10 at 65%.
Join 2 and 10 to make cluster 11 at 68%.
Join 9 and 11 to make cluster 12 at 68%.
Join 5 and 12 to make cluster 13 at 45%.

**ELEMENT MATCHING SCORES**

*Subject 11 - 84.86*

Note: Elements are single items. Thus the matrix is symmetrical.

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| 10 | 32 | 35 | 60 | 50 | 39 | 100 | 67 | 50 | 46 | *

Join 6 and 10 to make cluster 11 at 100%.
Join 1 and 2 to make cluster 12 at 96.43%.
Join 3 and 7 to make cluster 13 at 85.71%.
Join 12 and 8 to make cluster 14 at 78.57%.
Join 14 and 9 to make cluster 15 at 71.43%.
Join 4 and 5 to make cluster 16 at 67.86%.
Join 16 and 15 to make cluster 17 at 67.86%.
Join 13 and 11 to make cluster 18 at 67.86%.
Join 17 and 18 to make cluster 19 at 68.71%.

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P.R. Gamble  
Page 658
Full Monocle Analysis for Subject 11

Cluster Presentation of Grid
Subject 11 - 84.86

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**Full Monocle Analysis for Subject 12**

### Raw Grid Data

**Subject 12 - 04.86**

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### Construct names

- Means
- Ends
- Balanced
- One opin.
- Complete
- Partial
- One way
- Exchanges
- Future
- Backwards
- Controls
- Consults
- Use a lot
- Ad hoc
- Comm'cate
- Analyses
- Whole hot
- Individ

### Element names

- Computer reports
- Personal computer
- Spreadsheet analysis
- Synchronamics
- One:one
- Personal opinion
- Team meetings
- Telephone
- Calculator
- Large computer
- Professional consult
- Integrated info. sys

### Construct Matching Scores

**Subject 12 - 04.86**

The UPPER RIGHT half shows construct scores
The LOWER LEFT the reversed construct scores

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### Full Monocle Analysis for Subject 12

Join 1 and 5 to make cluster 10 at 66.67%
Join 10 and 7 to make cluster 11 at 54.17%
Join 11 and 9 to make cluster 12 at 54.17%
Join 2 and 6 to make cluster 13 at 50%
Join 3 and 13 to make cluster 14 at 50%
Join 14 and 12 to make cluster 15 at 41.67%
Join 4 and 15 to make cluster 16 at 41.67%
Join 16 and 8 to make cluster 17 at 12.5%

**ELEMENT MATCHING SCORES**

**Subject 12** - 04.86

Note: Elements are single items.
Thus the matrix is symmetrical.

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Join 1 and 4 to make cluster 13 at 97.22%
Join 7 and 12 to make cluster 14 at 96.11%
Join 10 and 14 to make cluster 15 at 96.11%
Join 2 and 9 to make cluster 16 at 93.33%
Join 16 and 11 to make cluster 17 at 90.56%
Join 5 and 17 to make cluster 18 at 90.56%
Join 8 and 15 to make cluster 19 at 75%
Join 18 and 6 to make cluster 20 at 72.22%
Join 3 and 20 to make cluster 21 at 61.11%
Join 21 and 19 to make cluster 22 at 61.11%
Join 13 and 22 to make cluster 23 at 41.67%
Appendix 8

Full Monocle Analysis for Subject 12

Cluster Presentation of Grid
Subject 12 - 04.84

Analyses 8
Partial 3
Consults 6
One opin. 2
Individ 9
Ad hoc 7
Ends 1
Backwards 5
One way 4

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Pro-Forma Used to Guide Case Study Interviews

INTERVIEW

1 Details of Establishment

Size, turnover, no. of employees, when opened.

2 What kind of technology is installed

Types of hardware and software, stand alone or integrated. Approximate cost. Date of installation. Is there a DP manager? Computer or hotel trained. Types of backup service.

3 Applications

Front of House: reservations, registration, billing, telephones.
F&B: CIS, stock take, inventory, ECRs, waiter comms., vending
Banquet/conf.: diary, word proc., guest history, costing.
Sales & Mktg.: guest history, MIS, mailing, sales planning & control.
Personnel:
Purchasing:
H/K & Maint.: co-ordinator, planned maintenance.
Accounting: receivables, payable, nominal, management accounts, payroll, credit.
General: budgets, forecasting, planning
Miscellaneous: project control
Special apps.: graphics, teletex, security, in room ent., self check-in/out

4 Decision to Install

What specific problems were being tackled. Who identified them. How long had they existed. Why did they have to be solved at that moment. How widely (across the organisation) was the problem recognised.

Who made the decision. Was it delegated, what was reporting link to senior management. Any pressures or influences for or against. Any special lobbying by special interest groups or suppliers. Which staff were involved. Was there any special consultation of user needs. How were staff kept informed of what was happening.

How was decision made - use of consultants, specialist advice. Which key individuals influenced choice. Was a feasibility study carried out. When was first installation done. Were any mistakes made, any changes of decision. What was the main worry when making the decision.

Is the same procedure still used for new decisions how/why was it changed?

Was it approached as a make or buy decision. Were specialist applications always considered. Possible use general business software.
5 How was the technology introduced

Negotiations, consultations with staff. Use of phases or modules. How effective was installation, did supplier do what was promised. How was the cutover planned/ handled. Any backlogs, problems caused.

What training, knowledge did the manager have. Any training, conferences, courses. What was effect of management style.

6 Training

Who did training, who planned, organised. Was it on or off job. Were any new, ready trained staff employed. What was availability of specialist expertise.

7 Employment of Staff

What was effect on jobs, any lost or gained. Any change in ratio of part time to full time, increase/decrease number of female employees. Effect on labour turnover. Resistance to change. Effect on recruitment - easier or harder to get staff.

8 Impact of New Technology

Attitude of staff to new approaches. Difference between operators, managers or between departments. Attitudes of unions if any. Any comments about job satisfaction. Changes in the nature of work or division of labour. Any suggestions for improvements from operators or department managers, can they influence what is done.

Reactions from guests. Any changes in the nature or quality of services.

Was the introduction of the technology used by management to introduce changes that they would like to have made anyway. Has the new technology helped to improve quality of decision making. Improved control over operations.

Any disadvantages - staff upheaval, limitations/failures of the system, limitations of equipment, lack of flexibility, shortage of information. Does the system have to be supplemented by manual or peripheral systems.

9 Evaluation

Was the system evaluated against a feasibility. Are any gains/losses specifically identifiable. Has it made money. Is it cost effective.

10 Plans for the Future

Will more or different technology be used. What lessons have been learned. Will different approaches, systems be tried. Any thoughts about more intelligent systems that will automate more decisions.

New areas to be approached. What is greatest current need if could have some sort of systems to tackle it. Any especially promising new developments.
** STAFF LUNCHES - MONDAY WEEK 4 **

Kitchen : MAIN KITCHEN

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<th>Recipe name</th>
<th>No of Portions</th>
<th>Portion size</th>
<th>Ingredient cost</th>
<th>Department</th>
<th>Coating method</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOUP OXTAIL</td>
<td>53</td>
<td>6 OZS</td>
<td>£ 1.04p</td>
<td>SOUP/ROAST</td>
<td>Cost</td>
</tr>
<tr>
<td>LAMB CASSEROLE</td>
<td>75</td>
<td>6 OZS</td>
<td>£ 22.74p</td>
<td>SOUP/ROAST</td>
<td>Cost</td>
</tr>
<tr>
<td>POTATOES BYRON</td>
<td>57</td>
<td>4 OZS</td>
<td>£ 3.35p</td>
<td>VEGETABLES</td>
<td>Cost</td>
</tr>
<tr>
<td>CAULIFLOWER au GRATIN FRESH</td>
<td>48</td>
<td>4 OZS</td>
<td>£ 5.38p</td>
<td>VEGETABLES</td>
<td>Cost</td>
</tr>
<tr>
<td>SWEET CHEESECAKE</td>
<td>32</td>
<td>1 SLICE</td>
<td>£ 1.21p</td>
<td>PASTRY</td>
<td>Cost</td>
</tr>
<tr>
<td>COFFEE</td>
<td>90</td>
<td>1 CUP</td>
<td>£ 4.51p</td>
<td>STILL ROOM</td>
<td>Cost</td>
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</table>

Total : £ 36.40p
**STAFF LUNCHES - MONDAY WEEK 4**

*Kitchen: MAIN KITCHEN*

Summary of dishes to be produced, with ingredient quantities

<table>
<thead>
<tr>
<th><strong>POTATOES BYRON</strong></th>
<th><strong>57.0 ptns</strong></th>
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</thead>
<tbody>
<tr>
<td>POTATOES MEDIUM</td>
<td>57.0 items</td>
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<tr>
<td>CHEESE CHEDDAR</td>
<td>855 grams</td>
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<tr>
<td>CREAM SINGLE</td>
<td>43 cl</td>
</tr>
<tr>
<td>OIL FRYING</td>
<td>128 cl</td>
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<tr>
<td>BUTTER</td>
<td>855 grams</td>
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<table>
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<tr>
<td>CAULIFLOWERS</td>
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<tr>
<td>CHEESE CHEDDAR</td>
<td>1080 grams</td>
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<tr>
<td>MILK</td>
<td>360 cl</td>
</tr>
<tr>
<td>MARGARINE</td>
<td>360 grams</td>
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<tr>
<td>FLOUR</td>
<td>360 grams</td>
</tr>
<tr>
<td>ONIONS</td>
<td>180 grams</td>
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<tr>
<td>EGGS</td>
<td>12.0 items</td>
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<table>
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<th><strong>LAMB CASSEROLE</strong></th>
<th><strong>75.0 ptns</strong></th>
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</thead>
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<tr>
<td>CARROTS</td>
<td>2063 grams</td>
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<tr>
<td>TURNIPS</td>
<td>2063 grams</td>
</tr>
<tr>
<td>PEAS FROZEN</td>
<td>1125 grams</td>
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<tr>
<td>BEANS FRENCH</td>
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<tr>
<td>LAMB NAVARIN</td>
<td>75.0 ptns</td>
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<tr>
<td>LAMB NECK BONELESS</td>
<td>8438 grams</td>
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<td>CARROTS</td>
<td>2109 grams</td>
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<tr>
<td>ONIONS</td>
<td>2109 grams</td>
</tr>
<tr>
<td>LEEKS</td>
<td>1078 grams</td>
</tr>
<tr>
<td>CELERY HEADS</td>
<td>4.7 items</td>
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<tr>
<td>PARSLEY</td>
<td>141 grams</td>
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<tr>
<td>STOCK BEEF</td>
<td>1125 cl</td>
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<tr>
<td>TOMATO PUREE 5 OZ</td>
<td>5 grams</td>
</tr>
<tr>
<td>LARD</td>
<td>516 grams</td>
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<tr>
<td>FLOUR</td>
<td>1078 grams</td>
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P.R. Gamble
### Example of Main Requisition Reports from the Catering Information System

#### PAGE 3

**The Ingredient Requisition**

<table>
<thead>
<tr>
<th>Ingredient name</th>
<th>Quantity issued</th>
<th>Quantity to be used</th>
<th>Store inventory</th>
<th>Issue status</th>
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<tbody>
<tr>
<td><strong>Issue</strong></td>
<td><strong>Units issued</strong></td>
<td><strong>Value</strong></td>
<td><strong>Metric</strong></td>
<td><strong>Imperial</strong></td>
</tr>
<tr>
<td><strong>LAMB DICED SHOLDS</strong></td>
<td>27 LBS</td>
<td>2106p</td>
<td>12587 grams</td>
<td>27 lb 12 oz</td>
</tr>
<tr>
<td><strong>FLOUR CULINARY 32KG</strong></td>
<td>1 KG</td>
<td>15p</td>
<td>729 grams</td>
<td>1 lb 10 oz</td>
</tr>
<tr>
<td><strong>ONIONS FRESH</strong></td>
<td>4 LBS</td>
<td>28p</td>
<td>1307 grams</td>
<td>3 lb 5 oz</td>
</tr>
<tr>
<td><strong>CAULIFLOWER FRESH</strong></td>
<td>12 LBS</td>
<td>252p</td>
<td>5443 grams</td>
<td>12 lb 0 oz</td>
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<tr>
<td><strong>MILK POWDER SKIMMED</strong></td>
<td>1 K</td>
<td>64p</td>
<td>219 grams</td>
<td>8 oz</td>
</tr>
<tr>
<td><strong>SALT COOKING 12.5K</strong></td>
<td>0 KG</td>
<td>0p</td>
<td>49 grams</td>
<td>2 oz</td>
</tr>
<tr>
<td><strong>DRIPPING</strong></td>
<td>2 LBS</td>
<td>0p</td>
<td>510 grams</td>
<td>1 lb 2 oz</td>
</tr>
<tr>
<td><strong>MILK PENGALS 3 GALL</strong></td>
<td>1 PT</td>
<td>17p</td>
<td>474 cl</td>
<td>8 pte 7 fl oz</td>
</tr>
<tr>
<td><strong>MIX CHEESE CAKE</strong></td>
<td>2 BAC</td>
<td>210p</td>
<td>802 grams</td>
<td>1 lb 15 oz</td>
</tr>
<tr>
<td><strong>POTATOES PEELED</strong></td>
<td>20 LBS</td>
<td>220p</td>
<td>9049 grams</td>
<td>19 lb 15 oz</td>
</tr>
<tr>
<td><strong>TOMATO PUREE 42.5</strong></td>
<td>1 KG</td>
<td>40p</td>
<td>331 grams</td>
<td>12 oz</td>
</tr>
<tr>
<td><strong>CARROTS FROZEN</strong></td>
<td>5 LBS</td>
<td>70p</td>
<td>2052 grams</td>
<td>4 lb 8 oz</td>
</tr>
<tr>
<td><strong>MARGARINE PASTRY 8OZ</strong></td>
<td>2 LBS</td>
<td>40p</td>
<td>653 grams</td>
<td>1 lb 7 oz</td>
</tr>
<tr>
<td><strong>OIL COOKING 20 LT</strong></td>
<td>1 20L</td>
<td>938p</td>
<td>32 oz</td>
<td>11 fl oz</td>
</tr>
<tr>
<td><strong>CHEESE CHEDDAR</strong></td>
<td>0 LBS</td>
<td>0p</td>
<td>1828 grams</td>
<td>4 lb 0 oz</td>
</tr>
<tr>
<td><strong>COFFEE NOCCOMAT TIN</strong></td>
<td>1 BAC</td>
<td>468p</td>
<td>.9 items</td>
<td>.9 items</td>
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<tr>
<td><strong>BEER PEPPER WHITE</strong></td>
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<td><strong>SUGAR GRANULATED 50K</strong></td>
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<td><strong>SPICE NUTMEG GBD</strong></td>
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<td>0 oz</td>
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<tr>
<td><strong>SOUP OXTAIL 1X8</strong></td>
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<td>147p</td>
<td>2.1 items</td>
<td>2.1 items</td>
</tr>
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<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>4994p</td>
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</table>

---

**Appendix 10**

Super Software Systems Ltd. Requisition number 25 from main store on Monday 1st August 1983

**STAFF LUNCHES - MONDAY WEEK 4**

Kitchen: MAIN KITCHEN
### Full Monocle Analysis for Subject 13

#### MONOCLE

**Raw Grid Data**  
Subject 13 - 07.86

<table>
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<th>12 Elements</th>
<th>Scale 1 to 5</th>
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</tr>
</tbody>
</table>

#### Construct names
- Doing
- Outcome
- Isolated
- Integrated
- Rec've In
- Pass Inf.
- Use need
- Continung
- Makes Dec
- Resit Dec
- Circle
- Problem
- Trigger
- Examines
- Retains J
- Method J
- Make hapn
- Part me

#### Element names
- Discussion 1:Many
- Discussion 1:1
- Reports
- Rotas
- Calculator
- Telephone
- Diary Log
- Small Computer
- Internal mail system
- Electronic mail
- Bleep system
- Personal Judgement

### Construct Matching Scores
Subject 13 - 07.86

The UPPER RIGHT half shows construct scores  
The LOWER LEFT the reversed construct scores

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<tr>
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<th>2</th>
<th>3</th>
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</tbody>
</table>

P.R. Gamble
Construct 7 reversed.
Construct 4 reversed.
Construct 5 reversed.

Join 7 and 9 to make cluster 10 at 66.67 %
Join 1 and 3 to make cluster 11 at 54.17 %
Join 11 and 8 to make cluster 12 at 54.17 %
Join 6 and 10 to make cluster 13 at 50 %
Join 4 and 13 to make cluster 14 at 41.67 %
Join 5 and 12 to make cluster 15 at 37.5 %
Join 2 and 14 to make cluster 16 at 33.33 %
Join 6 and 10 to make cluster 17 at 50 %

**ELEMENT MATCHING SCORES**

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Note: Elements are single items.</td>
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<tr>
<td>Thus the matrix is symmetrical.</td>
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</tbody>
</table>

Join 1 and 2 to make cluster 13 at 94.44 %
Join 7 and 9 to make cluster 14 at 88.89 %
Join 14 and 10 to make cluster 15 at 86.11 %
Join 6 and 15 to make cluster 16 at 83.33 %
Join 16 and 11 to make cluster 17 at 83.33 %
Join 17 and 8 to make cluster 18 at 72.22 %
Join 18 and 12 to make cluster 19 at 72.22 %
Join 13 and 5 to make cluster 20 at 69.44 %
Join 20 and 3 to make cluster 21 at 66.67 %
Join 4 and 21 to make cluster 22 at 58.33 %
Join 22 and 19 to make cluster 23 at 52.78 %
Cluster Presentation of Grid
Subject 13 - 07.86

Doing  14  1  1  1  2  3  5  5  5  2  5
Rec'Ve In  34  3  1  3  3  3  3  5  5  5  3  3
Retains 18  5  1  1  3  3  2  3  5  5  5  1
Resit Dec  57  5  5  1  1  1  1  1  5  5  5  3
Isolated  24  1  5  5  5  1  5  5  5  3  1  3
Continuing  44  1  1  1  5  5  1  5  5  5  3
Circle  69  1  1  1  3  3  3  3  5  1  3  3  5
Examines  74  5  5  3  3  3  1  3  3  5  5
Make hapsn 94  5  5  5  3  1  1  3  3  3  5

---

Outcome  1
Pass Inf.  1
Method  8
Makes Dec  5
Integrate  2
Use need  4
Problem  6
Trigger  7
Part me  9

---

(C) P.R. Gamble 1984

---

P.R. Gamble
## Full Monocle Analysis for Subject 14

### Raw Grid Data

Subject 14 - 06.86

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### Construct Names

- Tool
- Result
- Open infl
- Not infl.
- Covert pr
- Overt pr
- Technical
- Personal
- Must intp
- Apply dir
- Obtains
- Extracts
- Easy use
- Hard use
- Compl'v
- Direct'v
- Involves
- Impers'nl

### Element Names

- Financial projection
- SSADM - manual
- Microcomputer
- Think tank
- Discussion 1:1
- Paper - discuss doc.
- Investigations
- Synopsis
- Personal judgement
- Telephone
- SSADM - computerised
- Database

### Construct Matching Scores

Subject 14 - 06.86

The UPPER RIGHT half shows construct scores

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Full Monocle Analysis for Subject 14

Construct 2 reversed.

Join 6 and 8 to make cluster 10 at 70.83 %
Join 5 and 10 to make cluster 11 at 66.67 %
Join 1 and 4 to make cluster 12 at 62.5 %
Join 2 and 12 to make cluster 13 at 62.5 %
Join 3 and 11 to make cluster 14 at 58.33 %
Join 14 and 9 to make cluster 15 at 58.33 %
Join 15 and 7 to make cluster 16 at 41.67 %
Join 13 and 16 to make cluster 17 at 33.33 %

ELEMENT MATCHING SCORES
Subject 14 — 06-86
Note: Elements are single items.
Thus the matrix is symmetrical.

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Join 1 and 11 to make cluster 13 at 94.44 %
Join 3 and 10 to make cluster 14 at 88.89 %
Join 4 and 9 to make cluster 15 at 88.89 %
Join 6 and 8 to make cluster 16 at 88.89 %
Join 15 and 9 to make cluster 17 at 86.11 %
Join 17 and 7 to make cluster 18 at 83.33 %
Join 13 and 2 to make cluster 19 at 80.56 %
Join 16 and 18 to make cluster 20 at 77.78 %
Join 17 and 12 to make cluster 21 at 77.79 %
Join 14 and 21 to make cluster 22 at 75 %
Join 20 and 22 to make cluster 23 at 75 %
Computers and Innovation in the Hospitality Industry

Appendix 11

Full Monocle Analysis for Subject 14

Cluster Presentation of Grid
Subject 14 - 06.86

Easy use 7 6 6 5 5 4 4 3 3 3 3 3 3 2 2
Obtains 6 5 5 5 4 3 3 3 2 2 2 2 2 1 1
Comp'ive 6 5 5 5 4 3 3 3 2 2 2 2 1 1 1
Must intp 5 4 4 4 1 1 1 1 1 1 1 1 1 1 1
Covert pr 4 4 4 4 1 1 2 2 2 2 2 2 2 1 1
Involves 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
Tool 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
Technical 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
Not infl. 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2

Hard use 7
Extracts 6
Direct've 8
Apply dir 5
Overt pr 3
Impers'n 9
Result 1
Personal 4
Open info 2

Database
SSAPH - computerised
Financial projection
SSAPH - manual
Microcomputer
Investigations
Think tank
Discussion of
Personal judgement
Paper - discuss doc.
Synopsis

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P.R. Gamble

Page 673
### MONOCLE

#### Raw Grid Data

**Subject 15 - 05.86**

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**Construct names**

- Lead
- Arranges
- Cont. out
- Flexible
- Static
- Innate
- Total
- Like
- Dislike

**Element names**

- Formal 1:1 discuss
- Computer reports
- Calculator
- Personal judgement
- Informal 1:1 discuss
- Telephone
- Formal cttee mtg.
- Personal files
- VDU reports on-line
- Microcomputer

#### CONSTRUCT MATCHING SCORES

**Subject 15 - 05.86**

The **UPPER RIGHT** half shows construct scores
The **LOWER LEFT** the reversed construct scores

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Construct 2 reversed.
Construct 1 reversed.
Construct 5 reversed.

P.R. Gamble
Full Monocle Analysis for Subject 15

Join 2 and 3 to make cluster 9 at 90%
Join 1 and 9 to make cluster 10 at 80%
Join 10 and 8 to make cluster 11 at 80%
Join 4 and 11 to make cluster 12 at 70%
Join 12 and 7 to make cluster 13 at 60%
Join 5 and 13 to make cluster 14 at 60%
Join 14 and 6 to make cluster 15 at 30%

ELÉMENT MATCHING SCORES

Subject 15 - 05.86

Note: Elements are single items.
Thus the matrix is symmetrical.

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Join 11 and 6 to make cluster 12 at 93.75%
Join 9 and 10 to make cluster 13 at 93.75%
Join 5 and 13 to make cluster 14 at 84.38%
Join 2 and 8 to make cluster 15 at 76.13%
Join 3 and 14 to make cluster 16 at 78.13%
Join 4 and 16 to make cluster 17 at 78.13%
Join 15 and 12 to make cluster 18 at 75%
Join 18 and 17 to make cluster 19 at 65.63%
### Full Monocle Analysis for Subject 15

#### Cluster Presentation of Grid

**Subject 15 - Q5.86**

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