Executive Summary

This report covers the period from 1st Oct 2012 to 31st March 2013. During this period 2 major outcomes occurred; the transfer dissertation and the first paper. The dissertation was examined and passed with amendments in November 2012, which led to an addendum report. The first paper was accepted by the Journal of Strategy and Management for publication later this year, with revisions; these are ongoing, expected to finish later in April 2013.

The majority of this report lays out the current status of the research design, which is still in progress. The original research objectives are rephrased as a question with three elements; the underlying theory, a process for applying it within a company and the informational content used within that process. This in turn creates a set of propositions for each theme and a set of tests for those propositions. As there are three main levels of strategy decision within the case study company (corporate, product-service and technology) a high-level evidence grid is laid out showing provisionally how each theme could be tested at each level. Further details of evidence to be collected will be added later as the research design is concluded.

Although decisions happen at different levels, studies analysing proposals and making recommendations are created at fairly low level within the company. This is where the research will intervene in the decision-support process, to study the effects of the new approach on the studies themselves. Using these studies and their outcomes as the unit of analysis should lead to a consistent approach within the gathering of data.

The next research steps will be to finish the research design, and then complete an initial design of the approach method (process) and metrics (content) for use in pilot studies in the next few months. The outcomes from these will inform the selection and design of further studies in the summer and autumn.

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1 Introduction

This report covers the period from 1st Oct 2012 to 31st March 2013, although the active research period covers just under 5 months not 6 due to a gap due to illness.

2 Major Outcomes

2.1 Dissertation, Viva and Addendum

The halfway transfer dissertation replaced the 24 Month Report; it was examined at the viva on 22nd November and passed with recommendations for revisions. These were made by way of an addendum document (Winnard, 2012b) issued in December, which covered the topics of:

- Situating the research within the context of “strategy” and “decision-making” literature (essentially the EngD is aiming to support strategic decision-making at the host with supplemental information rather than change it).

- Defining “resilience” and its links to “sustainable development” (resilience for the purposes of this project is taken as the ability to maintain some level of function during disruption, to recover afterwards, and to adapt to changes).

- Further detail of the methodology (why the approach was selected and others discarded).

- Further clarification of the expected contribution to knowledge.

These outcomes will not be further discussed in this report as they are available in detail through the previous dissertation and addendum documents.

2.2 First Journal Paper Revisions

The first journal paper (Surviving or Flourishing? Integrating Business Resilience and Sustainability) was submitted to the Journal of Strategy and Management (JSMA) in November 2012 (Winnard, 2012d), and accepted in February 2013 for publication later this year provided some major revisions were made. A resubmission date of April 2013 was agreed with JSMA's editor. At the time of writing these revisions are in progress, and are being worked on together mainly by the Research Engineer and Dr Adcroft.
3 Ongoing tasks

3.1 Research Design

This has been based mainly on guidance in Yin’s Case Study Research (2009) and is an ongoing task. During this work, as part of creating the critical elements of the research design as a “logical plan” to deliver the project (ibid.p26-27), the original objectives were restated as a multi-part research question supported by propositions –see Table 1 below. This is a form of “purpose statement” for the project (Creswell, 2009, p111) and has allowed the splitting of the research into three main themes to help develop the design criteria.

3.1.1 Research Question

<table>
<thead>
<tr>
<th>Main Research Question:</th>
<th>How can strategic resilience be used to support and translate sustainability...</th>
<th>...into a more practical form for Ford, to support decisions with new methods...</th>
<th>...and metrics?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Themes</td>
<td>Theory (of the relationship between organisational resilience and sustainability)</td>
<td>Process (approach: whole and elements)</td>
<td>Content* (information used and generated)</td>
</tr>
<tr>
<td>Propositions</td>
<td>T1 sustainability and strategic resilience are linked</td>
<td>P1 Companies currently lack practical processes for incorporating the wider elements of sustainability within strategic decisions</td>
<td>C1 Metrics exist for the process inputs and outputs, which are theoretically sound (meaningful)</td>
</tr>
<tr>
<td></td>
<td>T2 resilience can be used to deliver and support sustainability for companies</td>
<td>P2 Organisational resilience could provide a framework and process to address future sustainability issues</td>
<td>C2 These metrics are useful for Ford with regard to addressing its business issues (relevant)</td>
</tr>
<tr>
<td></td>
<td>T3 there is an internal cascade from corporate goals down to product service system and technology level objectives which can drive resilient strategy selection</td>
<td>P3 This could deliver improved sustainability by improving recommendations from studies which inform strategic decisions</td>
<td>C3 These metrics are practical for Ford to generate (add value)</td>
</tr>
<tr>
<td></td>
<td>T4 the implementation of selected strategies builds back up into resilient corporate strategy delivery</td>
<td>P4 The process can be made suitable for use during strategic studies</td>
<td>C4 These metrics can be used in isolation from the process (transparent)</td>
</tr>
</tbody>
</table>

| Content*             |                                                                                   |                                                                                   |                      |
|                      |                                                                                   |                                                                                   |                      |
|                      |                                                                                   |                                                                                   |                      |

Table 1- Breaking the research question into themes

*The Content theme is still being developed and so the propositions shown here in particular may change later in the design process.
3.1.2 Unit of analysis

From developing the approach and theory it has become apparent that the *units of analysis* (Yin, 2009, p29) for the research might change depending on the organisational level of the decision under study, and depending on which part of the research question (the three themes) we are considering. For example: three main levels of strategy decision were identified in the 24 month report (Winnard, 2012c see Figure 4, p17), consisting of corporate business goals, product-service-system choice (including business model details) and technology selection or other functional projects below this, which support multiple product-services. The units of analysis are important because they define the data collection which must test the propositions, and they must be consistent for each question in order to build a reliable body of evidence.

In this project the case under study is singular (Ford Motor Company) but the research concerns the company’s resilience to competition and other elements of business context at corporate level, so therefore data on other firms and the business environment need to be collected when testing propositions at this level (see Yin, 2009 p29). At lower organisational levels the case is still singular in that it concerns Ford’s inner workings to support corporate level goals, so only company-specific information might be needed. On the other hand although a team study may concern an internal objective, it may also need to consider an external issue such as market changes, material resource constraints or sustainability-driven legislation. As the theory, process and content questions are all complex and involve multiple propositions, there will be many kinds of data, but all must fit the appropriate unit of analysis.

“Decisions” are not very concrete and can therefore pose some difficulties for finding units of analysis (Yin, 2009 p29), so due to the main question of this research we propose to avoid this problem by *analysing the effects of the approach on the studies conducted by individuals or teams* (Process theme), *and the recommendations they produce* (Content theme). These recommendations are only later fed into decision-making forums and to decision-makers. This offers the possibility of one generic unit of analysis suitable for testing the propositions under both the Process and Content themes. This idea will be tested out during the rest of the research design process. It is not yet clear whether this unit will also be suitable for testing all of the Theory propositions, as for example access to both current and past Ford corporate strategy decision studies is very limited within this project. The underlying theory developed during the work so far and summarised within the journal paper (Winnard, 2012d) points out that managing strategy is an internal activity within a firm and
Information surrounding other firms' decisions which might illuminate this area is usually difficult or impossible to access.

During discussions with Dr Adcroft it has become clear that the research is not going to be a multiple case study as first thought (based on the idea of multiple uses of the approach within one company), as the cases in such studies must be independent from each other. Rather it is a single case study as the actors in the teams each time are influenced by the same organisational context (Ford Motor Company), and in fact the same actors may recur in different team combinations doing strategic studies. The case study will however contain multiple samples of different studies, including one or more pilot samples.

### 3.1.3 Designing tests for the propositions

The proposed tests of the Theory propositions are laid out in table 2 below.

<table>
<thead>
<tr>
<th>Theory Proposition</th>
<th>Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>T1</strong> sustainability and strategic resilience are linked</td>
<td>T1i) does the literature review support this?</td>
</tr>
<tr>
<td></td>
<td>T1ii) general historical evidence – can this effect be seen for firms in the automotive sector or a similar one?</td>
</tr>
<tr>
<td><strong>T2</strong> resilience can be used to deliver and support sustainability for companies</td>
<td>T2i) does the literature support this?</td>
</tr>
<tr>
<td></td>
<td>T2ii) as for T1ii, is there historical evidence?</td>
</tr>
<tr>
<td><strong>T3</strong> there is an internal cascade from corporate goals down to product service system and technology level objectives which can drive resilient strategy selection</td>
<td>May only be testable within Ford case study</td>
</tr>
<tr>
<td></td>
<td>T3i) in each study sample, identify: what are the objectives driving the study and how do they link to corporate goals?</td>
</tr>
<tr>
<td></td>
<td>T3ii) identify in each sample - given the study's question(s): what are the sustainability and resilience related issues?</td>
</tr>
<tr>
<td><strong>T4</strong> the implementation of selected strategies builds back up into resilient corporate strategy delivery</td>
<td>May only be testable within Ford case study</td>
</tr>
<tr>
<td></td>
<td>T4i) track one or more strategy decisions influenced by the approach and find: has this resulted in increased resilience?</td>
</tr>
<tr>
<td></td>
<td>T4ii) if actual resilience data for T4i is not available in time: can a predictive proxy such as adaptive capacity be used instead from current data?</td>
</tr>
</tbody>
</table>

Table 2- Tests for Theory propositions
Proxies of a predictive nature are proposed for tests where results might not emerge in the project timescale. For resilience purposes these are likely to centre around adaptive capacity; Krumdieck (2011) uses this as an indicator for resilience. The elements and behaviours which support adaptive capacity are internal to companies (Winnard, 2012d), and not publicly available. Therefore it may only be possible to test with Ford’s internal data.

### Table 3: Tests for Process propositions

<table>
<thead>
<tr>
<th>Process Proposition</th>
<th>Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1 Companies currently lack practical processes for incorporating the wider elements of sustainability within strategic decisions</td>
<td>P1i) check what study teams and decision makers current process is; what are its issues and gaps?</td>
</tr>
</tbody>
</table>
| P2 Organisational resilience could provide a framework and process to address future sustainability issues | P2i) pilot the approach using only the data and questions from a recent study – is it useable in a typical study (by the RE- offline test)?  
P2ii) pilot the approach using a recent study and the same team, compare the new approach process with the current one; ask users is it easier to use the resilience approach than a sustainability focus or do they need both?  
P2iii) Do users feel the results could be incorporated into Ford decision processes? How?  
P2iv) after adjusting from the pilot results, gather more samples using data of “real” studies (if possible within them- in-line); ask the same question as for P2ii and P2iii of users |
| P3 This could deliver improved resilience and therefore sustainability by altering recommendations from studies which inform decisions | P3i) does the approach when used with sample study teams produce a significant difference in the recommendations?  
P3ii) does the solution recommended by the approach produce a difference in the resilience of the system in question?  
P3iii) would/does it produce a difference in the sustainability of the system in question?  
P3iv) are the resilience and sustainability effects reliably correlated, can we prove their link, can we use resilience as a proxy for sustainability? |
| P4 The process can be made suitable for use during strategic studies | P4i) ask sample study teams about the approach- could it be used to support “real” studies? Why?  
P4ii) if possible test the approach during at least one real study (Real-time in-line test): ask for user feedback- useable, useful?  
P4iii) check- is the approach the same for all organisational levels of study? |
| P5 The process is modular and if only some elements are used should still produce an effect | P5i) If only part of the process is followed do the results obtained by testing P3 still apply- does it produce significant results? |
The Process and Content being internal to Ford and based around the case study should mean more accessible data. The tests for the Process propositions are shown in Table 3. In reality it is likely that some of the sample studies would either have incomplete data for the full process, or the sample team(s) will not be available to do the whole process; and so modular testing (P5) must be assumed and planned around. And as there is no formal strategic decision-making process within Ford for many decisions, and the company’s wider implementation of the final approach is not within the project remit, suitability for use in Ford processes can only be established by asking the sample study team users (P2iii).

Finally the proposed tests for the Content propositions are shown in Table 4.

<table>
<thead>
<tr>
<th>Content Proposition</th>
<th>Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1 Metrics exist for the process inputs and outputs, which are theoretically sound (meaningful)</td>
<td>C1i) From Theory outcomes, which sustainability and resilience metrics are relevant to Ford’s type of business and what is their relationship?</td>
</tr>
</tbody>
</table>
| C2 These metrics are useful for Ford with regard to addressing its business issues (relevant) | C2i) From Theory outcomes, which sustainability and resilience metrics are relevant to Ford at each organisational level?  
C2ii) if these vary widely with decision/system type and context for a given level, is there a generic guideline for which (e.g. types) should be used instead? |
| C3 These metrics are practical for Ford to generate (resource load vs. added value) | C3i) is each metric already data created within Ford?  
C3ii) if yes can the study team access this information?  
C3iii) if not can the study team create it?  
C3iv) if no, do they have good access to support functions or experts who can?  
C3v) are there any other obstacles to the team generating these metrics? |
| C4 These metrics can be used in isolation from the process (transferability, transparency) | C4i) can people outside the study teams and RE’s contacts understand the metrics without training?  
C4ii) if not, how much training is required to allow them to understand the metrics?  
C4iii) do the individual metrics have any meaning for Ford employees outside of the new process?  
C4iv) do they cause any confusion or can they be misused outside of this process?  
C4v) ask users –are the metrics likely to be accepted and understood by other people, especially decision-makers? |

Table 4- Tests for Content propositions (provisional)
It is expected that the result of C4 may be that metrics cannot be used alone outside the new approach, but instead would be used to inform recommendations within it. Metrics associated with sustainability are likely to centre around impacts, whereas those associated with resilience are likely to centre around adaptive capacity, and both may include risk and uncertainty. Due to the system view proposed for the studies the other metrics are likely to vary with the function of the system being studied.

3.1.4 Evidence collection

As the tests were being developed (this is still in-progress, particularly for Content propositions), the planning of the evidence generation was begun to ensure that its collection covered all of the themes at the right level and therefore will answer the primary research questions. This builds up a “logical model of proof” using the four main elements of construct validity, internal validity, external validity and reliability (Yin, 2009, p26, p40-41). These ensure the correct things are measured by the case study, that it can establish causal relationships amongst the data, demonstrate generalizability of the results and show that this was done in a repeatable way. An evidence grid is being used to perform this task and note any issues with gaps in data, due to there being 3 “themes” and 3 main organisational levels for which data is required. If there is insufficient access to data to complete the research as designed, Yin points out that the case study itself or the research questions will need to be changed (ibid., p40-41). This does not look likely within this project as there will be access to study teams to gather the data needed.

The current high-level version of the evidence grid is shown in Table 5. This identifies the general source of each type of evidence and multiple sources if possible. As the research design develops in more detail this will expand to show the specific evidence required for each test in terms of detailed data and sources. The majority of studies below the corporate level within Ford concern the effects of proposals (including technology selection) on the product-service system (PSS). This means in practice the two lower levels may not be differentiated by their objectives, metrics or outcomes, and potentially that the tests and evidence for one will cover both. If there is insufficient time then the lowest level (technology) tests will be abandoned to allow full coverage of the more important upper levels. The grid shown here is also noticeably different from the sources originally considered in the dissertation (Winnard, 2012c) –because it concentrates on the most direct sources of data. Some of the extra sources of evidence about adoption of the technique or awareness of the issues it addresses will also be sought but details have yet to be added.
<table>
<thead>
<tr>
<th>Theory theme</th>
<th>Process theme</th>
<th>Content theme</th>
<th>Comments/Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Corporate level</strong></td>
<td>Literature review 1st paper argument Public web data on automotive companies/other sector resilience and sustainability issues and outcomes Literature data on the same Internal data; links between set corporate goals and objectives; and between their delivery</td>
<td>Interview Ford employees on strategic decision processes and establish current practice (partly done). Test approach at corporate level. Test approach at national sector level? Participate, observe and interview users.</td>
<td>Use Theory results to generate potential metrics at this level (possibly Shared Value based) Compare to metrics of interest to study teams. Test these at corporate level. Test at national sector level? Record and generate metrics. Poor access to internal data on other companies; may not be able to access internal high-level info to support theory. Poor access to corporate studies but may be able to test within industry body instead.</td>
</tr>
<tr>
<td><strong>PSS/ Division level</strong></td>
<td>Does theory argument still hold at this level? (further theory?) Internal data; links between set corporate and mid-level objectives; and their delivery External data: sustainability and resilience of PSSs by competitors/other sectors, predicted and/or actual</td>
<td>Pilot approach at division level (partly done). Pilot approach on recent product study (identified). Test approach on more than one study. Participate, observe and interview users.</td>
<td>Use Theory and corporate level derived metrics to work out cascade of high level objectives to mid-level ones. Compare to metrics used by study teams. Pilot metrics at mid-level. Test metrics on more than one study. Record and generate metrics. Not all metrics will be available to teams/RE within Ford. This will restrict some test aspects. Use external data? current/past products/future plans of competitors; Market trends; Sustainability and resilience issues for PSSs?</td>
</tr>
<tr>
<td><strong>Technology/Team function</strong></td>
<td>Does theory argument still hold at this level? (further theory?) Internal data; links between set mid-level and lower level objectives; and their delivery</td>
<td>Pilot approach at Technology level. Test approach on more than one study. Participate, observe and interview users</td>
<td>Use external data; sector technologies past current and future; Technology roadmaps; Sustainability and resilience issues for technologies? Record and generate metrics. For all tests: participate, observe and interview users, generate and record content.</td>
</tr>
</tbody>
</table>

Table 5- High-level evidence grid
During the research it is likely that some data will be needed by the study teams which is not normally collected by the company. As a participant-observer the RE is likely to be involved in finding or creating this new data, which may be qualitative or quantitative. So although the main component of this phase is a case-study, the overall research will in fact be a mixed-methods approach as it is driven by pragmatism (Creswell, 2009, p10) - creating something which works for a project conducted in a real company.

3.2 Identifying the intervention point in the decision process

One step in this kind of project is the identification of where an intervention can be made in the decision-making process to test the ideas. However due to the organisational level the project both works with and originates from (mid to low-level management and specialists), the remit to actively intervene within the strategic decision-process itself was excluded right from the start, as the senior-level access and support required for that would likely be lacking; hence the project being framed in terms of decision-support.

The initial interviews of Ford staff involved in both strategic decision-support and decision-making confirmed that there is no consistent or formal process in most cases and that the decision-maker (usually the most senior person involved in the process) therefore defines both the process and the information used within it. This also occurs where proposals or questions originate lower in the organisation; the questions the decision-maker asks in response to a proposal, and the format in which they request or will accept information, define both process and content (Winnard, 2012a). This therefore means the process and content of decision-making vary widely. However much of the analysis which supports decision-makers is done at lower levels within the company, and so in practical terms this is where any intervention in strategic studies can and should be made. Thus the point of intervention will be by working with the teams of engineers and lower level managers who produce supporting information and recommendations. These will be accessed using the RE and industrial supervisor’s company networks.

4 Baseline interviews

At the time of the last report it was proposed to add some more interviews and observations of decision-makers and forums (ibid., p19). Due to limited time and access this has not happened; however it is felt that these interviews are very unlikely to supply any new insights and so the research can continue without them, and the intervention point remains the same. Further information may arise from data taken within the case study samples, or if unexpected interview opportunities arise, in which case this decision can be reviewed.
By way of triangulation, a small number of external interviews are ongoing, to provide information on other companies in the automotive and other sectors. It is expected that some other companies and consultancies do sometimes employ sustainability or even resilience approaches as advocated by the research, even if there are very few research articles published to that effect. The data from these interviews would serve to check the kind of benefits expected from such an approach, current practice in terms of method in other sectors, and also potentially whether potential benefits are perceived as actually being delivered. Initial results from the first couple of interviews indicate that the use of a structured strategic approach to sustainability, and even the use of resilience as a framework, is developing amongst practitioners and growing in popularity with some other blue-chip companies outside automotive, to address pressing sustainability issues (Winnard, 2013).

5 Next steps

The research activities over the next few months split into several areas. The majority of effort is expected to go into the case study samples themselves, but before this some earlier activities will be needed to support this.

5.1.1 Finishing the first paper submission

This is planned to occur in April. Changes to the paper may inform a slightly different approach to the design of the process and content proposition tests in the case study samples. They also inform how the tests of the Theory will be made; for example the types of historical data sought.

5.1.2 Completing the initial research design

The plan of tests and evidence needs to be more fully developed to drive how the case samples are conducted. This is an ongoing task and is planned to be complete by the end of May, although it will be adjusted again later depending on the results of pilot (and potentially, later) samples. The focus will be first on developing the approach for use by pilot sample teams, with enough initial metrics to operate it (the metrics may change after the first tests). It is also expected to concentrate on one organisational level initially -the PSS-level as this is where the majority of studies in the host R&D site focus.

5.1.3 Developing the approach –the manual

In order to involve other people in testing the approach and its metrics some form of simple instruction manual will be needed to explain the approach and allow people to use it; although the RE expects to be a participant-observer in all early samples, at least, some form of document is likely to be needed by all the other participants for when they are not
with the RE. Part of this work consists of establishing how the approach relates to other common Ford techniques in terms of its basic concepts and elements of its method. The plan is to develop a simple version for use in the pilot samples in April-May. This manual will also form part of the research documentation of the method of manipulating data (the content) for the samples and be used to ensure consistency between samples.

5.1.4 Developing the content- metrics

In order to use the process in a pilot sample some defined metrics will be needed. These will be developed from the theory work supporting the first journal paper revisions and also from the development of the approach method itself. The metric development is expected to happen in parallel with this, providing metrics by April-May.

5.1.5 Pilot sample studies

These overlap with the initial research and approach design in an iterative way. The design informs the interaction with the pilot sample team member(s). Their feedback and the pilot results adjust the research design and the approach. The pilot samples will use data from already-existing recent studies, and interpretation by the team that produced them, to inform an offline exercise. They will also be used to help develop and test the manual and metrics for use in other studies. The interaction with sample teams is planned to be an intermittent process over some time, although shorter in the case of pilot samples; the first pilot has been provisionally selected, is being investigated for suitability, and is expected to go on for 2-3 months (finishing around June) in parallel with other activities.

5.1.6 Other sample studies

As the initial pilot samples come to a close and their results are reviewed it is planned to begin the main sequence of samples. These are not yet fully identified, and the evidence grid will be used to focus their selection according to the research design. For example all sample studies must contain a question about sustainability which can be rephrased as an issue of resilience, for them to be useable within the research. These samples are expected to begin in mid-year and continue for the rest of the year in parallel with other tasks.

These other tasks are expected to be other types of test as shown by the evidence grid (for example historical data to test the theory), development of the method (process) where the samples find gaps, and initial analysis of the samples and tests as identified in the previous research report (Winnard, 2012c).
5.1.7 Timing plan

The latest plan is shown at the end of this report in Figure 1. It shows the next few months of activity in more detail up to the next report. The three task types are taken from the last report.

### Figure 1- Research timing plan for next 6 months

**Acknowledgements**

The author wishes to acknowledge and thank both the Engineering and Physical Sciences Research Council and Ford of Britain for their assistance and support in funding this work. Thanks are also due to the University of Surrey’s Centre for Environmental Strategy for all their support on the EngD course and project, Ford of Britain for hosting this project, and all those colleagues and contacts internal or external to Ford who have participated in the research interviews and discussions so far.
References


