

**MANAGING INNOVATION SEARCH AND SELECT
IN DISRUPTING ENVIRONMENTS**

**Submitted by
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ABSTRACT

This thesis explores how organisations manage new product development (NPD) focused innovation across a portfolio of core, adjacent and breakthrough environments. The study focuses on the search and select phases of the innovation process, and how incumbents identify and validate a range of opportunities. Organisations face the paradox of how to establish search and select routines for focal markets, while also setting up routines to sense and respond to disruptive innovation signals from adjacent and more peripheral environments. The study builds on research into peripheral vision, and considers how organisations operationalise innovation search and select in disrupting environments.

To analyse how organisations manage search and select in turbulent environments, the author conducted research in the disrupting higher education (HE) publishing industry using qualitative research methods. The study focused on ten case companies, and the researcher conducted 61 interviews with 63 individuals over a six month period across ten companies publishing 9,000 out of the world's 32,000 academic journals. The interviewees ranged from CEOs and CTOs to production, operations, editorial, publishing, sales and marketing directors and managers.

The analysis revealed 11 search and select capabilities that need to be in place to manage NPD effectively in HE publishing. The research identified five contextual factors that influence how search and select is operationalised in disrupting environments. A framework is proposed to enable the mapping of individual opportunities within a wider NPD portfolio. The project identified ten key market insight areas where firms in the HE publishing sector need to focus.

The findings have implications for practice, especially for HE publishers, online media companies, and business to business service organisations. Further research is proposed into how the cognitive frames of boards and senior teams affect the structure and operationalisation of NPD portfolios; how visual media companies search for, develop (ideate) and select programme and film projects in the disrupting media sector; and how workflow mapping and the identification of jobs-to-be-done is deployed within the NPD process in different settings.

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LIST OF ABBREVIATIONS

AC	Absorptive Capacity
B2B	Business-to-Business
B2C	Business-to-Consumer
Bn	Billion
BM	Business Model
BPM	Business Process Management
BPMS	Business Process Management Systems
BTC	Beyond The Core
COUNTER	Counting Online Usage of Networked Electronic Resources
CSR	Case Study Research
DMU	Decision Making Unit
GDL	Goods-Dominant Logic
HASS	Humanities and Social Sciences
HE	Higher Education
ICT	Information and Communications Technology
M&A	Mergers and Acquisitions
MPV	Minimum Viable Product
N/A	Not Applicable
OA	Open Access
OI	Open Innovation
OSS	Open Source Software
PSS	Product-Service System
R&D	Research and Development
RBV	Resource Based View
RCC	Rapid Change Core
ROI	Return on Investment
SDL	Service-Dominant Logic
SNA	Social Network Analysis
STM	Science, Technical and Medical
UP	University Press
VRIN	Valuable, Rare, Inimitable and Nonsubstitutable

CHAPTER 1: INTRODUCTION

1.0 Introduction

This thesis is concerned primarily with how organisations manage innovation search and select considering new product development opportunities across core, adjacent and breakthrough settings in disrupting digital environments.

Chapter one provides an overview of the thesis. After discussing the background to the research, the nature of the research problem is presented. An outline of the research aim, objectives and methodology follows. A brief summary of the contents of each of the six chapters of the thesis are also presented.

1.1 Background to the Research

In increasingly unpredictable markets, requirements change constantly and fresh competition emerges undermining the competitive advantage of incumbents. New technologies, business models and market opportunities develop just as fast (Radjou & Prabhu, 2015). Innovation, and especially technology innovation, is seen as essential for the long-term survival and growth of the firm (Brown & Eisenhardt, 1998; O'Reilly & Tushman, 2008; Schumpeter, 1942a).

Even though new products are more likely to fail than to succeed, competitive and profit pressures require firms to invest in product development projects, even when little is known about the commercial viability of opportunities in the early stages of the innovation cycle (Brown & Eisenhardt, 1997; Hauser, Tellis, & Griffin, 2006). Organisations need to develop effective search and select routines to identify viable new product development opportunities.

Innovation strategies typically address both the “do better” development of existing technologies, products and services, and the development of new technologies, capabilities and value propositions. Innovation involves identifying tools, ideas and opportunities to create knowledge and take new and improved services and products (offerings) to market (Subramaniam & Youndt, 2005).

While the importance of pursuing both exploitative and exploratory innovation is often emphasised, there is much to be explained about how effective ambidextrous organisations coordinate the search and selection stages of the innovation process (Birkinshaw & Gupta, 2013; Jansen, van den Bosch, & Volberda, 2006) across a portfolio of innovation opportunities considering core, adjacent and breakthrough opportunities in the periphery of an organisation's operational environment (Cooper, 2013; Day & Schoemaker, 2006; Day, 2007; Killen & Hunt, 2013).

Portfolio methods aim to solve the problem of how to review a set of projects considering both the incremental "do better" and more radical "do different" agendas, looking for a balance of economic and non-financial risk/reward factors (Cooper, Edgett, & Kleinschmidt, 2001; Heising, 2012; Urhahn & Spieth, 2014).

The innovation process takes place within very different organisations in multiple contexts, varying from steady state to sectors subject to major technological and market disruption (Carnabuci & Operti, 2013; Dobbs, Manyika, & Woetzel, 2015; Downes & Nunes, 2013). The research project is focused on the innovation search and select processes in the disrupting higher education (HE) publishing industry (Barber, Donnelly, & Rizvi, 2013).

The search and select stages are central to classic and contemporary innovation theories (Laursen, 2012; Lopez-Vega, Tell, & Vanhaverbeke, 2016; Winter & Nelson, 1982). The study is concerned with how firms manage new product development search and select in disrupting environments.

1.2 Background to the research setting: Why Higher Education publishing?

The thesis reports on the search and select innovation capabilities of publishers in the under-researched HE publishing sector. The total scientific, technical and medical (STM) information market was worth \$26.2 bn in 2014 (Cookson, 2015), with the scholarly journals market alone worth \$6.8 bn in 2014 (Cookson, 2015). HE publishing is disrupting due to the impact of the digitisation of the research and learning processes, globalisation, and an increasing expectation that research should be freely available (Barber, Donnelly, & Rizvi, 2013; Byrnes et al., 2014; Cookson, 2015; Duncan, 2015; “Free-for-all,” 2013; Jamali, Russell, Nicholas, & Watkinson, 2014). The study considers the key search and select capabilities in ten incumbent journal and book publishers, including six out of ten of the largest journal publishers by number of journals, as they map the innovation space to identify, create and commercialise a portfolio of innovation projects in core, adjacent and peripheral/transformational markets (Day & Schoemaker, 2006; Nagji & Tuff, 2012).

Scholarly publishing is a high margin industry. Elsevier, the market leader, publishes 16% of the journal articles published by leading publishers, and secures operating profit margins of 34% (Cookson, 2015). The sector includes Cambridge University Press, the world’s oldest publisher, established in 1534. The first journal was published in 1665 by The Royal Society in London. The HE publishing industry is disrupting due to fast changing delivery mechanisms, i.e. digital content, changing business models (Atkins, 2014), and limited funding for scholarly content (Ware & Mabe, 2015).

Publishing and research dissemination are changing, with Research Councils UK, a means through which the UK government directs funding to academic researchers, having ruled that from 2013 the results of the research that it pays for will have to be published in journals that make them free through Open Access (OA) – ideally straight away, but certainly within a year. In the US the White House Office of Science and Technology has followed a similar path, as has the European Union (Cookson, 2015; “Free-for-all,” 2013). A recent EU report showed that the tipping point (more than 50% of the papers available for free) for OA has been reached in several countries, including Brazil, Switzerland, the Netherlands, the US, as well as

in biomedical research, biology, and mathematics and statistics (Archambault et al., 2013).

HE is globalising. In 2011, there were 4,266,000 foreign students enrolled in tertiary education systems beyond their own countries. This has increased from 2,072,000 in 2000 (OECD Publishing, 2013). Collaboration between researchers from different institutions and countries is increasing, and the position of the established science superpowers of the United States and Europe is declining (Adams, 2012).

Henry Oldenberg of The Royal Society founded the world's first scientific publication in 1665, and from the start it was an international journal, drawing on new ideas from France, Hungary, Italy and Germany. Fast forward 350 years, and science is a massive and global activity, with the dissemination of research increasingly an imperative for the funders of research. In 2011 it was estimated that there are over 7 million researchers worldwide, supported by a collective international R&D (research and development) spend of US\$1,000 billion (*Knowledge , networks and nations global scientific collaboration in the 21st century*, 2011).

With HE publishing disrupting due to digitisation, globalisation, cost pressures and new business models including Open Access mandates connected to government research funding, the scientific, technical and medical (STM) information market is unlikely to escape further change. For these reasons the HE scholarly publishing sector provides a dynamic and rapidly changing research context for the research project.

1.3 Motivation for the research

Throughout 12 years as a board director of a HE publishing company, the author was regularly frustrated by the organisation's difficulties in developing a portfolio driven innovation and new product development (NPD) process. The research project has provided the opportunity to develop an understanding of the scholarly innovation literature, and has enabled the researcher to develop contributions to the academic literature, as well as developing outputs supporting practice.

1.4 Research objectives

The thesis addresses the research question: “How do organisations manage innovation search and select in disrupting environments?” To mobilise the research question, seven research objectives were established.

Search	Select
Research Objective 1: How do organisations manage innovation search in core markets in disrupting environments?	Research Objective 2: How do organisations manage innovation select in core markets in disrupting environments?
Research Objective 3: How do organisations manage innovation search in adjacent markets in disrupting environments?	Research Objective 4: How do organisations manage innovation select in adjacent markets in disrupting environments?
Research Objective 5: How do organisations manage innovation search in breakthrough areas in disrupting environments?	Research Objective 6: How do organisations manage innovation select in breakthrough areas in disrupting environments?
Research Objective 7: What is the influence of context on the operationalisation of innovation search and select capabilities in disrupting environments?	

Table 1.1: Research objectives

1.5 Significance of the study

The research project makes four contributions to the existing body of knowledge: Firstly, 11 search and select capabilities that need to be in place to manage NPD effectively are identified, and their presence and significance is assessed considering the case companies.

Secondly, five contextual factors influencing the operationalisation of NPD search and select capabilities in disrupting environments are identified.

Thirdly, a scoping framework guiding organisations on where to look for NPD opportunities is proposed.

Fourthly, a conceptual model detailing ten key market insights that inform NPD across core, adjacent and breakthrough environments is proposed.

The project extends Day and Schoemaker’s “Seven steps to bridge the vigilance gap” (2006).

1.6 Organisation of the thesis

The thesis is presented in six chapters, as illustrated in Table 1.2

Chapter 1	Development of the research topic
Chapter 2	Review of the innovation literature
Chapter 3	Research philosophy Identification of research objectives Development of research design Securing access to case companies Explanation and justification of the research methodology
Chapter 4	Findings: In case analysis Findings: Cross case analysis
Chapter 5	Discussion: In case Discussion: Cross case Contribution 1: Innovation search and select capabilities Contribution 2: Influence of context Contribution 3: Scoping framework Contribution 4: What to look for Extending Day and Schoemaker
Chapter 6	Conclusion: Academic contribution Implications for practice Limitations Recommendations for further research

Table 1.2: Overview of the research process

Chapter 1: Overview of the Research

The thesis is presented in six chapters, as illustrated in Table 1.2. This section outlines the content of the chapters that form the remainder of this thesis.

Chapter 2: Innovation Literature Review

This chapter explores the innovation literature that is relevant to the research question: “How do organisations manage innovation search and select in disrupting environments?” The literature review considers 27 themes within the academic innovation management, strategy, cognition and peripheral vision literature.

The discussion of the literature identifies 11 key search and select capabilities that support the identification and validation of opportunities across the new product development portfolio.

Chapter 3: Research Methodology

This chapter describes and justifies the research methodology. The chapter provides assurance that appropriate methods and techniques were used throughout the research exercise. Consideration is given to the philosophical underpinnings of knowledge production, and two main scientific paradigms are identified. The affinity of this research to a pragmatic research philosophy is explained, as is the abductive approach, due to the exploratory nature of the study.

The research design is presented and justified. It is argued that a multi case study approach is both appropriate and desirable for this research project. The criteria for case selection are explained. This is followed by a description of the data collection framework used in the fieldwork phase of the research project. Finally, issues of validity, reliability, and ethics are addressed.

Chapter 4: Findings

This chapter reports on the empirical data collected to address the research question. The chapter describes how the data was analysed, and presents the findings from the data analysis. The findings are presented in two sections. Firstly, the findings from the in case analysis of the ten case companies are presented. Secondly, the findings from the cross case analysis of the ten case companies are presented.

Chapter 5: Discussion

In this chapter the findings from Chapter 4 are discussed within the context of extant literature to address the research question. Four contributions to the academic literature are identified and expanded upon:

Contribution 1: 11 key NPD search and select capabilities are identified, and their presence and significance is assessed considering the case companies.

Contribution 2: Five contextual factors influencing search and select activities are identified.

Contribution 3: A scoping framework guiding organisations on where to look for NPD opportunities is proposed.

Contribution 4: A conceptual model detailing ten key market insights that inform NPD across core, adjacent and breakthrough environments is proposed.

An extended version of Day and Schoemaker's "Seven steps to bridge the vigilance gap" is also proposed.

Chapter 6: Implications and limitations; recommendations for further research.

The research project delivers new knowledge to the academic and practitioner communities, and this contribution is discussed.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

The purpose of this chapter is to examine research into how incumbent firms in the HE publishing sector search for and select NPD opportunities in core, adjacent and breakthrough environments through a review of the relevant literature.

Chapter 2 is organized in 29 sections, with the structure of the literature review shown below in Table 2.1.

Theme
0. Introduction
1. The significance of the Innovation Process
2. Defining innovation
3. The product development funnel
4. Search
5. Select
6. Disruptive innovation
7. Strategy
8. Disrupted and disrupting environments
9. The end of sustainable competitive advantage
10. Strategy development and implementation in complex environments
11. Challenges in responding to disrupted and disrupting environments
12. Fast Second: How do incumbents miss out the pre-diffusion stage, and successfully commercialise radical innovation opportunities?
13. Cognition
14. Innovation portfolio management managed on a core, adjacent, and breakthrough basis
15. Dynamic capabilities
16. Ambidexterity
17. Open innovation
18. Business Models
19. Peripheral vision, vigilance and weak signals
20. Opportunity recognition and evaluation
21. Market research in the digital era
22. Operationalising search & select to balance exploitation with exploration
23. Forecasting and scenario planning
24. User driven innovation
25. Identification and validation of pervasive problems, considering jobs-to-be-done
26. Agile innovation and minimum viable products (MVPs)
27. The role of knowledge in innovation management:
<ul style="list-style-type: none"> • Introduction • Individuals • Absorptive capacity • Networks • Mergers and Acquisitions • Summary: Knowledge
28. Literature Review Summary

Table 2.1: Literature review structure

2.1 The significance of the Innovation Process

Innovation has long been considered to be an engine of growth. It can also enable growth independent of the larger economy. Schumpeter focused on the importance of new products as a generator of economic growth (Schumpeter, 1942a) arguing that the competition created by new products was far more significant than the marginal changes in the prices of existing products. Incumbent companies regularly fail, or only achieve slow growth.

Thomas Edison, the holder of over 1000 patents, understood that the real challenge in innovation is not invention, but the process of making the good ideas work technically and commercially (Israel, 1998). Edison recognised that innovation is not just coming up with good ideas. It is the process of growing the ideas so that they can be applied into practical use. A consistent finding in the literature is that innovation, in the majority of cases, relies deeply on external sources, summarised succinctly as: “Popular folklore notwithstanding, the innovation journey is a collective achievement that requires key roles from numerous entrepreneurs in both the public and private sectors” (Van de Ven, Polley, Garud, & Venkataraman, 1999, p149).

Over the past 50 years, scholars have developed a significant body of academic research and writing on innovation. Much of the research has focused on different aspects of technological innovation (e.g. Henderson & Clark, 1990b; Utterback, 1994), but the last 20 years have seen the exploration of other aspects of innovation, such as process innovation (Pisano, 1996), service innovation (Weinstein & Gallouja, 1997), and strategic innovation (Hamel, 1998; Markides, 1997).

A significant stream of research has explored how the marketing function influences the organisation’s approach to survival and growth (Jaworski & Kohli, 1993; Kohli & Jaworski, 1990). A major finding of this research is that firms that are more rather than less market orientated are typically more innovative (Frambach, Prabhu, & Verhallen, 2003; Ottum & Moore, 1997) and have greater levels of profitability over time. Market orientation involves “organisation-wide generation of market intelligence, dissemination of the intelligence across departments and organisation-wide responsiveness to it” (Kohli & Jaworski, 1990).

The failure of incumbent firms to overcome inertia when challenged by discontinuous technological change has long been an area of scholarly enquiry (Hannan & Freeman, 1977; Henderson & Clark, 1990a; Tushman & Reilly, 1996). A major reason for this is that incumbent failure is so prevalent (Tushman & Anderson, 1986; Christensen & Rosenbloom, 1995). It is also intriguing that these failures take place so regularly when managers are aware of change that will affect their organisations (Johnson, 1988).

Through seeking to understand how the innovation process functions in different environments, considering the position of incumbent firms (Tellis, 2013) and disruptive organisations (Christensen, 1997), the author acknowledges that managing the innovation process touches all aspects of the organisation (Tushman & O'Reilly, 1996), and the networks that they operate within (Adner, 2013; Gulati, 2007).

2.3 Defining Innovation

There are many definitions of innovation, but all emphasise the need to complete the development and exploitation of new ideas, converting new knowledge into benefits for stakeholders. A regular challenge in researching, discussing and carrying out innovation is the confusion between innovation and invention. Innovation comes from the Latin – *innovare* – meaning “to make something new” (Tidd & Bessant, 2013).

Drucker helps us with defining innovation, observing that: “Innovation is the specific tool of entrepreneurs, the means by which they exploit change as an opportunity for a different business or service. It is capable of being presented as a discipline, capable of being learned, capable of being practiced” (Drucker, 1985, p. 19).

However, the emphasis on entrepreneurship, which is conducted in many different ways by challenger companies, incumbents and networks, limits the utility of this definition.

Porter emphasised the importance of newness, writing: “Companies achieve competitive advantage through acts of innovation. They approach innovation in its broadest sense, including both new technologies and new ways of doing things” (Porter, 1990). In the current, highly networked business environment, the emphasis on companies is a limitation of this definition, as is the focus on competitive advantage, which is becoming increasingly short lived, as companies and products sustain themselves for shorter periods (McGrath & Kim, 2014).

Recognizing that innovation is best managed within an overall process, the definition of innovation guiding this thesis is pragmatic, and focuses on the utility of innovation:

“Innovation is the successful exploitation of new ideas”

Innovation Unit, UK Department of Trade and Industry (2004).

2.4 The product development funnel

The product development funnel concept is based on the understanding that most products are developed following a logical and standard sequence, with activities, tasks and routines that are consistent across development projects across different sectors and product types (Zedtwitz, Friesike, & Gassmann, 2014).

At defined stages, projects are either supported for further development, or cancelled, narrowing down the number of projects over time. Starting from a broad set of possibilities, organisations end up with a small set of implementations (Cooper, 2011). The development funnel emerged from earlier phased NPD approaches, such as the high profile “Phased project planning” approach deployed by NASA in the 1960s (Baker & Sweeney, 1978), which led to project scrutiny through defined “gates” that projects needed to pass through to progress to the next stage of development. The stage-gate process driven forwards by Cooper (1985, 2011) is one of the most widely adopted product development funnels.

This thesis adopts a model of innovation as: “The process of converting ideas into a state of reality and then capturing value from them” (Tidd & Bessant, 2013, p.21). The innovation process has four main phases, each of which must deal with particular challenges.

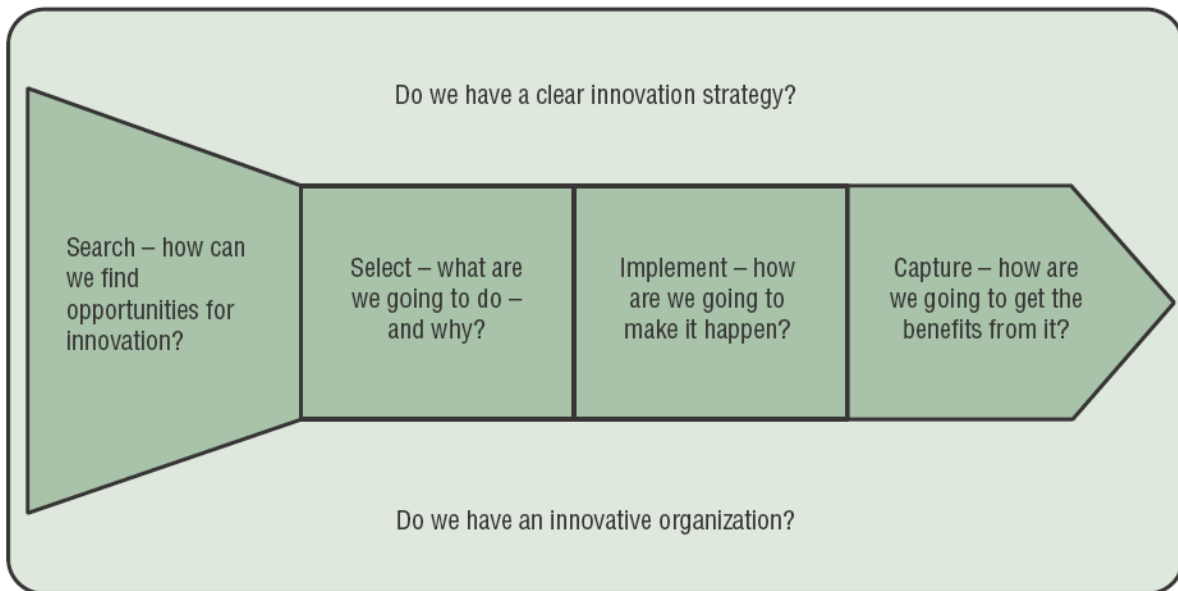


Figure 2.1: Process model of innovation (Tidd & Bessant, 2013, p.47)

The first phase involves the search for new ideas. The ideas can come from new technologies, societal change, government standards, competitors, R&D, culture – to identify just a few sources. However, the challenge for both incumbent firms – those already established well in a market, and new organisations wanting to grow, is how to organize a search process that delivers an ongoing stream of opportunities, giving organisations improved chances of both continuing to deliver value to stakeholders, and growing new and previously unmet market opportunities (Lopez-Vega et al., 2016; Tidd & Bessant, 2013).

The second phase is about selecting the ideas from the options generated that offer the greatest opportunities of success. The selection process demands that organisations make strategic choices about where to focus their activities. Factors that directly influence selection include the development of a differentiated value proposition, and how organisations can build on existing capabilities (Cooper & Edgett, 2006; Tidd & Bessant, 2013).

The third phase is concerned with implementation, and allocating resources and energy to turn ideas into reality. Implementation involves managing an increasing commitment of resources – time, money, emotion and knowledge of different types to a project, while the outcomes are uncertain. Organisations are betting that they can make the idea work for stakeholders inside and outside the firm, that they can manage the project(s) to plan, and that the returns will be greater than the resources put into it (Klingebiel & Rammer, 2014; Tidd & Bessant, 2013).

The fourth phase is all about capturing value from the innovation project(s). How can organisations ensure that all the work and effort has been justified, either in financial terms or in the creation of social value. How can the organisation make sure that competitors do not just adopt the idea, and make it work for them? The organisation will consider what it has learned from the innovation initiative, and how it can deploy the learning in the future to best effect (James, Leiblein, & Lu, 2013; Tidd & Bessant, 2013).

The approaches that organisations take to innovation vary widely. However, the product development funnel process described above operates widely. Procter and Gamble will seek to pick up signals about potential needs and technical options, develop a strategic concept, finalise a range of products, and then seek to capture the value from all this work through an integrated and high impact launch process (Dodgson, Gann, & Salter, 2006a; Lafley & Martin, 2013). Sustaining innovation (Bower & Christensen, 1995) is typically driven forwards by incumbent firms, and involves changing internal processes, following the same basic process, triggered by perceiving and validating needs through signals that identify both the need for change, and the options for change.

The innovation paradigm includes products and services, an organisation's supply chain, public service delivery such as the NHS in the UK, small/medium sized enterprises (SMEs) and large companies with formal R&D operations, organisational and market ecosystems (Dodgson, Gann, & Phillips, 2014; Tidd & Bessant, 2013). The paradigm has been extended by the digitisation of many products (music, written media, film and entertainment) and how people communicate (digital social

media, e-mail, voice and face to face communication services e.g. Skype) (Füller, 2010; Schmidt & Cohen, 2013).

The degree of innovation being contemplated affects how the innovation process works, as does the size of firm, sector or wider technological or societal context. A significant and influential number of researchers (Cooper, 2011; Tidd & Bodley, 2002; Leonard-Barton, 1993; Utterback & Abernathy, 1975) have emphasised the need to take the degree of novelty in an innovation into account. The approach to managing the incremental improvements vital to sustaining innovation differs from the management of radical projects that demand cross-functional collaboration both within the firm, and possibly across a company's eco-system (Adner, 2013; Hansen & Nohria, 2004). Organisations often need to develop different routines and organisational structures to manage innovation when encountering discontinuous conditions, when the "rules of the game" change (Brown & Eisenhardt, 1998; Radjou & Prabhu, 2015). When a disrupting sector is shouting "do different things" to organisations due to major technological, user, social and political shifts – as is the case in HE publishing markets – then organisations may have to search for trigger signals and pervasive opportunities in less defined and unfamiliar places (Christensen, Anthony, & Roth, 2004). Firms seek to be vigilant and identify the weak signals early enough for them to move to areas of high opportunity (Day & Schoemaker, 2006; Schoemaker, Day, & Snyder, 2013).

2.5 Search

Organisational processes and capabilities are needed to be effective at searching for innovation opportunities. The study draws on general models of information processing and organisational learning, but has a particular focus on the unclear and uncertain signals that come from adjacent markets and the periphery of a business, and compares the processes and capabilities needed by incumbent businesses to search peripheral, adjacent and focal areas of activity.

The search phase within the innovation process sees organisations scanning their environment, internally and externally, and trying to make sense of the relevant signals about opportunities, threats and competitive activity. Triggering the innovation process is about much more than occasional moments of inspiration. Knowledge push (Brem & Voigt, 2009; Dosi, 1982), needs pull (Abrahamson, 1991; Rothwell, 1992), needs from the “bottom of the pyramid” (Prahalad, 2004b), lead users (von Hippel, 2005), ethnography (Cayla & Arnould, 2013), the observation of users in digital environments known as netnography (Kozinets, 2002, 2015), learning from big data (Brynjolfsson, Hitt, & Kim, 2011), design thinking (Kelley, 2001), seeking to do more with less (Radjou, Prabhu, & Ahuja, 2012; Radjou & Prabhu, 2015), mistakes (Schoemaker, 2011), intelligent failure (McGrath, 2011; Schoemaker, 2011) and many other activities can be deployed to search for opportunities for innovation. Ideas are not in short supply. Most of these sources of innovation reflect both push and pull elements, and there are risks in focusing overly on either push or pull drivers of innovation.

The challenge for organisations is that the search space is multi-dimensional. An important contribution of Henderson and Clark (1990) was their finding that search activities were not just about searching close to, or at a distance from core knowledge concepts, but were also about searching across configurations and presenting the “component/architecture challenge”. They argued that innovation is more often about developing and managing a bundle of knowledge which needs to be turned into a configuration to deliver a product or service, and that innovation is rarely about a single technology or market. Effective innovation management requires firms to source and deploy knowledge about components, and to be adept at connecting up the components to deliver value. Their work brought consideration of the architecture of innovation to the fore, and this concept has been further developed to reflect the importance of networks and changing technology (Kapoor & Adner, 2011). The problem solving approach of the firm influences their innovation management, and affects whether organisations are bounded by firm and industry norms, or manipulate both components and architecture (Hargadon, 2002; Nickerson & Zenger, 2004).

There are dangers in not listening to market needs. Counter intuitively, there are dangers in listening to markets and customers too closely and limiting the quest for new product opportunities to better solutions for existing problems (Verganti, 2011). How companies search for options matters – summed up by Henry Ford, who is alleged to have said: “If I had asked the market they would have said that they wanted faster horses!” Christensen’s research has demonstrated the dangers of relying on customers for innovation signals to great effect (Christensen & Anthony, 2004 ; Christensen, 1997). Market research tends to explore versions of products that already exist, rather than helping people to respond to concepts beyond their existing experience (Lafley & Martin, 2013; Wilson, Zeithaml, Bitner, & Gremler, 2012; Doyle, 2002). Ethnography has come to the fore as a powerful input to the market research process, and Cooper and Edgett (2008) have identified that ethnography is more effective in the “ideation” phase than customer visit teams, focus groups or other market research techniques.

A key dimension that influences the search for triggers is the Abernathy and Utterback model of the innovation life cycle, which sees innovation at the early fluid stage concerned with significant experimentation and the focus being on the product and the creation of a radical new offering (Utterback & Abernathy, 1975). As a dominant design becomes established, attention moves to more gradual developments around the core trajectory. With the maturation of an industry, innovation focus moves to process innovation to deliver product characteristics like quality and cost.

In addition to choices between exploit and explore search activities, businesses need to decide where to search. Christensen identified that organisations often conduct “explore” search activities, but in areas which reinforce the boundaries between their focal markets and new innovation spaces. He found that high rates of R&D investment pushed technological frontiers further in existing product categories, resulting in “technology overshoot” that did not help the companies to compete in emerging markets (Christensen, 1997).

Outside a focal market other groups of potential users often exist, with different needs – typically for simpler and cheaper products – which help users to get something done (Christensen, 1997). The pattern is of disruption, and the rules of the game change dramatically in a market, with new market segments frequently being created, with some winners and losers. Disruptive innovation examples of the kind identified by Christensen (1997, 2003) demonstrate the requirement for organisations to identify needs which are not being met, are being partially met, or where there might be technology overshoot creating opportunities for simpler and cheaper products (Ulwick, 2005). All or any of these needs could be the trigger for innovation, and they often initiate disruption because existing organisations do not see the different or new patterns of needs. This thinking underpins the concept of “Blue Ocean Strategy” (Kim & Mauborgne, 2005), which argues that companies should define and explore uncontested market spaces through identifying latent needs that are not well satisfied.

The innovation search literature recognises that the breadth of external search supports the identification of new ideas (Jeppesen & Lakhani, 2010; Laursen & Salter, 2006; Leiponen & Helfat, 2011; March, 1991; von Hippel, 1988). The “variance hypotheses” suggest that access to a wide range of information provides the “requisite variety” of knowledge required to develop innovations (Owen-Smith & Powell, 2004; Powell, Koput, & Smith-Doerr, 1996). Innovation activities are risky and uncertain, and a wider external search increases the likelihood of overall NPD success (Leiponen & Helfat, 2011). Firms typically take a distributed approach, allocating resources to explore a range of domains (Dahlander, Mahony, & Gann, 2014).

Searching for new ideas is carried out by individuals, as organisations cannot “search”, even though the firm’s leadership and strategic plans will typically set the objectives of search activity (Li, Maggitti, Smith, Tesluk, & Katila, 2013). The actual process of a successful search depends: “On the individuals who stand at the interface ofthe firm and the external environment” (Cohen & Levinthal, 1990, p. 132). Despite the search for new opportunities being an established activity, the search processes of individuals are not well understood (Gruber, Harhoff, & Hoisl, 2013; Maggitti, Smith, & Katila, 2013).

Innovations created by a firm are, in essence, a product of the organisation's knowledge. From a RBV (resource based view) perspective, mergers and acquisitions (M&A) can be seen as a means to bring new resources and capabilities into an organisation to enhance innovation (Ahuja & Novelli, 2014). Acquisitions are a process through which routines or uncodifiable knowledge can be brought in to the acquiring firm (Ahuja & Katila, 2001; Capron, Dussauge, & Mitchell, 1998), providing an alternative to the internal development of resources, with the potential to shorten development time (Dierickx & Cool, 1989). Acquisitions have the advantage of potentially giving a firm rapid access to resources in comparison to other approaches to inter-organisational knowledge sourcing relationships (Hagedoorn, 2002; King, Slotegraaf, & Kesner, 2008).

This thesis investigates innovation search considering NPD specifically, in the context of both exploit and explore innovation. M&A represents an option within the search toolset.

2.6 Select

Organisations encounter triggers for innovation internally and externally, in their core business, adjacent markets and in areas that often seem peripheral to their focal activities, and however large or profitable, they never have the resources to explore all of them. The options they consider, particularly in the early stages of the innovation process, are rarely well defined, or easy to compare. Innovation concerns opportunities to do something new. The process always involves uncertainty, and the further an organisation moves from the focal business, the more it feels like driving through fog (Day & Schoemaker, 2004a). The only way to increase certainty about an opportunity is to get a project started, and learn through exploring and refining the product or service idea while considering costs, market size, technology and wider organisational capabilities (Tidd & Bessant, 2013).

Stage-gate approaches support the process of limiting uncertainty and moving to informed risk-management (Cooper, 1994, 2011). At the end of each phase, projects are reviewed and need to pass specified criteria, before they can be promoted to the next stage. The reviews typically involve formalised project review

meetings, and consider market and customer feedback, strategic fit, technical feasibility, resource availability and potentially much wider considerations (Zedtwitz et al., 2014).

The effectiveness of the implementation of stage-gate processes varies, as does the overall operationalisation of innovation processes and “best practice” (Bessant & Francis, 1997). There is a danger that a “one-size-fits-all” or “traditional” approach is taken when considering innovation and NPD stage-gate processes, with challenge coming particularly from the project management field (Kok & Biemans, 2009; Shenhar, 2001). Shenhar (2001) argued that multiple project management approaches are taken when managing stage-gate NPD processes, with multiple types of innovation processes and associated contingencies also found to be successful (Salerno, Gomes, Oliveira, Bagno, & Freitas, 2015). A wide range of assessment criteria are also used to review and select projects (Baker, 1974; Jeng & Huang, 2015).

When the innovation approach is focused on exploitation, organisations like Toyota practice high involvement innovation (Bessant, 2003; Liker, 2004; Ohno, 1988), with improvement programmes based on staff and supplier generated ideas, with considerable supporting information often building impressive results over time (Fujimoto, 2014; Womack, Jones, & Roos, 1990). The further the distance from well understood focal markets, the greater the degree of technological and market uncertainty, which in turn increases levels of innovation project failure (Doctor, Newton, & Pearson, 2001; Wang, Lin, & Huang, 2010). The increased involvement of external players using open innovation techniques on incremental innovation initiatives, particularly with service products, is making incremental innovation more dynamic and complex (Chesbrough, 2011; Gassmann, Enkel, & Chesbrough, 2010).

NPD projects are characterized as having significant novelty, complexity and dynamism (Zedtwitz et al., 2014). These factors combine to make the development of new products inherently high risk, and the capabilities required to manage risk are essential to successful innovation management (Kwak & LaPlace, 2005; Mu, Peng, & Maclachlan, 2009).

Organisations develop persuasive business cases to support rigorous decision making, using tools such as simulation and prototyping. The range of tools available to generate and evaluate ideas both inside and outside the organisation continues to develop (Coyne, Clifford, & Dye, 2007; Heising, 2012), with approaches enabling an extended “play” step, postponing innovation selection as late in the process as possible to increase knowledge – and decrease uncertainty – as much as possible (Dodgson, Gann, & Salter, 2007; Dodgson et al., 2005; Dodgson & Gann, 2014).

While the tools and routines to support decision making advance in step with technology and networked product development (Hauser et al., 2006), the selection and ongoing support (or “kill” decisions) regarding innovation opportunities are often subjective, political, and influenced by the cognitive frames of key players (Block & Keller, 2009; Eisenhardt & Bourgeois, 1988; Killen & Hunt, 2013; Ocasio, 1997; Van de Ven et al., 1999).

2.7 Disruptive innovation

The theory of disruptive innovation (Bower & Christensen, 1995) was built on the premise that small, high-growth focused companies can be particularly effective at: “Agilely changing product and market strategies” (Bower & Christensen, 1995, p. 50). The authors continued: “No matter the industry, a corporation consists of business units with finite life spans: the technological and market bases of any business will eventually disappear. Disruptive technologies are part of that cycle” (Bower & Christensen, 1995, p. 53). Bower and Christensen’s original article (1995, p. 53) closed with key observations: “For the corporation to live, it must be willing to see business units die. If the corporation doesn't kill them off itself, competitors will”, and: “Managers of established companies can master disruptive technologies with extraordinary success. But when they seek to develop and launch a disruptive technology that is rejected by important customers within the context of the mainstream business's financial demands, they fail - not because they make the wrong decisions, but because they make the right decisions for circumstances that are about to become history” (Bower & Christensen, 1995 p. 53).

Christensen's findings and the theory of disruptive innovation were disseminated widely through the widely referenced and read *Innovator's Dilemma* (Christensen, 1997), and subsequent publications (e.g. Christensen & Eyring, 2011; Christensen & Overdorf, 2000; Christensen & Raynor, 2003). By 2014, the phrases "disruptive innovation" and "disruptive technology" had become part of the popular management lexicon, with references to these phrases increasing from practically none in 1995 to over 2,000 references in 2014 alone (Christensen, Raynor, & McDonald, 2015).

Christensen's disruption theory has its roots in Schumpeter's theory of creative destruction (Schumpeter, 1942a). A major long-term perception stemming from Schumpeter's theory has been that creative destruction has typically been achieved through the efforts of small, challenger companies, and that incumbent firms rarely launch or have success with radical product innovations (Chandy & Tellis, 2000). A major study into "The Incumbent's Curse" demonstrated that pre-world war 2, non-incumbents introduced 73% of radical innovations, but that this proportion had declined to 26% in more recent times, with incumbents accounting for 74% of radical innovations (Chandy & Tellis, 2000).

New technologies emerge with increasing frequency, and they have the power to destroy markets entirely (Chandy & Tellis, 2000). Consistent with Christensen's theory (1997), Chandy and Tellis (2000) confirmed that new technologies appeal first to niche segments, and that as products improve – and get cheaper – they appeal to the mass market. However Chandy and Tellis (2000) found that incumbents in a sector launch potentially disruptive technologies more frequently (53%) than new entrants (47%). Secondly, incumbents are more likely to cause disruption in a market than entrants due to their capabilities as consolidators, once the dominant design has been established (Markides, 2004).

Contrary to Christensen's theory of disruptive innovation, disruption is not the preserve of new entrants. Chandy and Tellis (2000) found some incumbents were disrupted by new entrants, and other incumbents possessed the capabilities to take disruptive technologies to market successfully themselves. Tellis (2013) persuasively builds the argument that it is internal culture that determines whether companies can overcome the inertia of organisations and their major customers (Dawar, 2013;

Tellis, Prabhu, & Chandy, 2009; Tripsas & Gavetti, 2000), allied to a willingness to cannibalise existing product and profit streams (Danneels, 2008; Tellis, 2013).

The research underpinning Christensen's theory has been challenged (King & Baatartogtokh, 2015; Lepore, 2014). Follow up interviews with the 77 cases cited by Christensen and Raynor have suggested that no one theory is sufficient for explaining so many diverse cases (King & Baatartogtokh, 2015). Christensen et al (2015) recognise that there are problems when disruptive innovation is conflated with any and every breakthrough that changes the competitive patterns in an industry. Different types of innovation demand a range of different innovation approaches.

In addition to helping fuel interest in innovation processes and innovation management, as demonstrated by the attention given to disruptive innovation (Christensen et al., 2015; "Disrupting Mr Disrupter," 2015), Christensen and his co-researchers have successfully focused attention on understanding why incumbents regularly lose out to challengers attacking the low end of the market. Through adopting a new technology, and/or new business models, disruptors can successfully target segments of low interest to incumbents, then use improvements in technology and widening acceptance of new business models to expand into the core customer base of established players (Chesbrough, 2010; Sull, 2015; Teece, 2010). Leaders of incumbent companies face genuine dilemmas: Do they invest to sustain the core business that is producing profits now, or explore new environments which could threaten the core due to the reallocation of resources, key staff or cannibalisation?

The theory of disruptive innovation was developed as the organisation and knowledge flows of high technology companies were identified as reflecting the architecture of their core products (Henderson & Clark, 1990). The reconfiguration of the architecture of an organisation's structure built to support other products, and a sustaining dominant logic is complex, with change difficult to mobilise (Prahalad & Bettis, 1986). Leonard-Barton's work revealing how core competencies become core rigidities (1992), demonstrations of the significance of early successful investments on future investments and innovation performance (Noda & Bower, 1996), and the influence of mutually reinforcing commitments to strategic customers,

suppliers, cognitive frameworks and technical capabilities (Sull, 1999, 2015) are related to the organisational inertia of incumbents (Tripsas & Gavetti, 2000).

The argument that “real” disruptive innovation succeeds by attacking from the low end of the market (Bower & Christensen, 1995; Christensen et al., 2015) is challenged by the success of Apple, which has typically grow by aiming at the top end of an opportunity to build strong margins and revenues, while Netflix and Uber have grown through providing solutions to solve the pain points of core customers (“Disrupting Mr Disrupter,” 2015). While challenger companies can use new technologies to revolutionise old industries, established companies can be adept at using their financial strength and proven capabilities as consolidators to move into adjacent environments (Chandy & Tellis, 2000; “Disrupting Mr Disrupter,” 2015; Markides & Geroski, 2005; Markides, 2004; Tellis & Golder, 2002; Tellis, 2013).

The relevance of the theory of disruptive innovation to the study is that narrow cognitive frames can develop through focusing on the core business, and responding to powerful customer voices, while not building the capabilities to manage search and select processes both in the core business, and beyond the core. The theory of disruptive innovation rightly emphasises organisational inertia as a blocker to innovation, in much the same way that Tellis et al. have divided incumbents into those who have the culture and willingness to cannibalise products and organisational structures to support innovation more broadly, and the organisations who do not (Tellis et al., 2009; Tellis, 2013).

2.8 Strategy

Strategy researchers seek to understand what strategists must do to develop and sustain the environment within the company to “win” in business. “At a minimum, strategy is what makes a firm unique, a winner or a survivor” (Thomas & Pruett, 1993, p.3). However, it is through the process of innovation that competitive advantage is actually developed and brought to market. “Whatever the dominant technological, social or market conditions, the key to creating – and sustaining competitive advantage is likely to lie with those organisations which continually innovate” (Tidd & Bessant, 2013, p. 14).

There are many definitions of strategy, considering political, military, business and many other areas of endeavour. Freedman explains the essence of strategy as follows: “The realm of strategy is one of bargaining and persuasion as well as threats and pressure, psychological as well as physical effects, and words as well as deeds. This is why strategy is the central political art. It is about getting more out of a situation than the starting balance of power would suggest. It is the art of creating power” (Freedman, 2013, p. xii).

Strategy can enable organisations to understand and respond to market and environmental change, particularly considering how they can compete. A well thought strategy will not make success inevitable, but it can provide protection from organisational failure (Thomas & Pruett, 1993, p.3). The work needed to put together a successful strategy is made more complex by the high velocity environmental change that faces businesses, in an era of “hyper competition” (Chen, Katila, McDonald, & Eisenhardt, 2010; D’Aveni, 1995; Hermelo & Vassolo, 2010).

Strategy centres on creating sustainable competitive advantage that differentiates the firms’ value proposition from competitors, despite their attempts at replication. Successful value propositions provide tangible benefits to customers and consumers (Anderson, Narus, & Wouters, 2006; Osterwalder, Pigneur, Bernarda, & Smith, 2014; Payne & Frow, 2014), delivered through the integration of organisational components in ways that rival firms find hard to imitate (Barney, 1991).

The importance of looking within the firm when considering strategy was developed as the “Resource-based View of the Firm” (Wernerfelt, 1984), which also directed attention to “The Theory of the Growth of the Firm” (Penrose, 1959), and her view of the organisation as a “bundle of productive resources”. The resource based view (RBV) moved forwards with the identification of three main categories of firm resources: physical capital resources, human capital resources, and organisational capital resources (Barney, 1991, 1996). The RBV challenged the positioning view directly, as it considered that it was internal resources, and how they are allocated, which yield competitive advantage.

During the uncertainties of the 1990s, as companies struggled with uncertain and depressed economic conditions, thinking developed concerning building capabilities that support adaptability, flexibility, innovation and organisational learning to generate competitive advantage as a more secure route to growth (Prahalad & Hamel, 1990; Teece, 2007). The aim of strategy moved on from Porter's positioning view (1985) seeking best fit with an existing environment, to the idea that organisations could seek uniqueness by creating their own internal environment, so that they could reshape themselves in revolutionary ways in the manner of Dell or Southwest airlines, with reconfigured value chains or alternative methods of value delivery (Hamel, 1996).

Mintzberg recognised the human forces at play in developing and implementing strategy (Mintzberg, 1987, 1990), with the process of running an organisation offering few certainties, and little stability internally or in the external environment. As different perspectives came into the strategy process, different ideas and developments could be taken into account and diffused through the organisation. As the importance of knowledge, and the integration of knowledge across functions, became acknowledged as a pivotal element within the strategy toolkit (Grant, 1996), skills and expertise in "organisational knowledge creation" were recognised as being key to how companies innovate (Nonaka & Takeuchi, 1995). The importance of current insights and stakeholder understanding started to become part of the oxygen fuelling decision making, planning, resource allocation and strategy execution within firms.

For incumbents, strategic renewal is a set of practices that can guide leaders into a new era of innovation (Binns, Harreld, O'Reilly, & Tushman, 2014). Strategic renewal demands that changes and decisions are taken ahead of a crisis, but the strategic renewal process is hard to initiate, finance, lead and translate into value for internal and external stakeholders. The role of senior management is to design and lead strategy, experimentation and execution into the culture and day-to-day routines of the organisation. Many companies have tried to respond ahead of their respective crises, such as Xerox, Kodak and Firestone, but failed (Tellis, 2013). To support strategic renewal, businesses need to be able to identify the "must win battles" in

both their core and emerging market areas, so that they can channel resources to compete and innovate effectively (Killing, Malnight, & Keys, 2005).

2.9 Disrupted and disrupting environments

The Shorter Oxford English Dictionary defines “disrupt” as: “To interrupt the normal continuity of (an activity); throw into disorder” (Trumble & Stevenson, 2003, p. 710). The management literature has focused on disruptive innovation (Bower & Christensen, 1995; Christensen et al., 2015), and considered disrupted environments (Markides & Oyon, 2010; Sood & Tellis, 2011). Consideration of disrupting environments, i.e. markets, processes and jobs-to-be-done being in the process of being disrupted, is not evident in the innovation literature. Disrupting environments provide dynamic conditions for incumbents and challengers to identify, evaluate and pursue opportunities (Dobbs et al., 2015; Downes & Nunes, 2013). Operating in disrupting environments is challenging, requiring companies to deal with uncertainty (Courtney, Kirkland, & Viguerie, 1997; Tversky & Kahneman, 1974), complexity (Sull & Eisenhardt, 2015; Weaver, 1948), resource allocation (Klingebiel & Rammer, 2014; Laslo & Goldberg, 2008) and uncertain cognitive frames (Kaplan, 2008b; Leiponen & Helfat, 2010).

The title of “The Upside of Turbulence” (Sull, 2009) challenges incumbents who run their organisations in an incremental “exploit” manner. Sull (2009, p. 12-15) identified three factors that drive turbulence and affect strategy decisions, all of which have increased in recent decades:

1. **Dynamism:** The frequency and magnitude of change influence a firm’s ability to create value. The psychological effect of changes can magnify their influence, e.g. 9/11, the financial crisis of 2007-8
2. **Complexity:** The number of forces that influence value creation, and the level of interaction between them, is increasing. With more interconnectedness, there is greater exposure to unanticipated changes from multiple directions. Technology also diffuses faster across multiple sectors
3. **Competition:** Extends beyond product markets to include clashes over scarce resources e.g. capital, distribution partners, & talented employees

Sull (2009) considers that the distribution of opportunities and threats across markets and industries follows an “inverse power law”, where “golden opportunities” caused by turbulence typically occur once or twice a decade for most companies, and often in downturns. The pattern is common across a wide range of complex systems. He also saw that the constant exploitation of small opportunities provides the organisational wherewithal to seize “golden opportunities” – where timing is essential, and opportunities usually come about through external forces.

The business environment is fast changing and uncertain because of economic interconnectedness, globalisation, and rapid technological change. The diversity and range of business environments has increased. Large firms are especially under pressure, as they stretch across a growing set of environments that are changing rapidly over time “Requiring businesses not only to choose the right approach to strategy or even the right combination of approaches, but also to adjust the mix as environments shift. One (strategy) size does not fit all” (Reeves, Haanæs, & Sinha, 2015, p.2).

2.10 The End of Sustainable Competitive Advantage

The cycles within which organisations identify, develop, exploit and retreat from markets are shortening, so they need to innovate more quickly, reliably, and efficiently, through exploitation activities in focal markets which continue to offer strong returns, and exploration beyond core environments.

Strategy researchers have recently been challenged by McGrath (2013), who argues: “Virtually all strategy frameworks and tools in use today are based on a single dominant idea: that the purpose of strategy is to achieve a sustainable competitive advantage. This idea is strategy’s most fundamental concept. It’s every company’s Holy Grail. And it is no longer relevant to more and more companies” (McGrath, 2013a, p. xi). This is in contrast to previously accepted strategy objectives, where researchers sought to understand how a firm can create: “Enduring firm differences in above-normal returns” (Oliver, 1997, p. 697).

McGrath argues that for organisations and their leaders to be successful in volatile and uncertain markets, they need to develop transient competitive advantage, so that they can take advantage of short-lived opportunities rapidly and decisively (McGrath, 2013a). With the main objective of strategy under attack, the structures, routines and processes that leaders depend upon to secure maximum value from competitive advantage become liabilities in fast-moving competitive environments. The experience of RIM (Blackberry), Xerox et al, and their failure to build their next wave of competitive advantage, are good examples of how quickly dominant positions and strong profitability can erode (Binns et al., 2014).

Much of the limitations of earlier work in the strategy discipline go back to the roots of Michael Porter and others in industrial organisation economics, with firm performance largely predicated on the structure of the underlying markets where firms compete, and the different positions that firms take in these markets. A central assumption was that, as Porter observed, the structure of an industry demonstrated relatively stable technical and economic dimensions, enabling researchers to analyse performance over extended periods of time (Porter, 1981).

Scholars adopting the RBV concentrated far more on issues within firms, rather than what was going on in the environment surrounding them (Galunic & Rodan, 1998; Ahuja & Katila, 2004). Associated research streams considering capabilities within the firm have included organisational learning (Cohen & Levinthal, 1990); organisational evolution and adaptation (Adner & Levinthal, 2004); the management of knowledge (Helfat & Raubitschek, 2000); path dependent development of assets (Dierickx & Cool, 1989) ; and organisational structure (Robins & Wiersema, 1995). These scholars saw processes and internal structures as being key influences on performance.

The 1990s saw a mounting challenge to the idea of sustainable competitive advantage (D'Aveni & Gunther, 1994), initiating a flow of research questioning the dominant logic of sustainable competitive advantage. The emphasis was that markets exist where hypercompetition is the norm, rather than competitive equilibrium (Gimeno & Woo, 1996; Ilinitch, D'Aveni, & Lewin, 1996). Going back to the roots of the study of innovation in the modern era, the assumption made by these

researchers is that all positions of advantage are temporary, as they will inevitably be swept away by “waves of competitive destruction” (Schumpeter, 1942a).

The RBV and economic views of strategy both adopt certain assumptions. Firstly, that industries have distinct boundaries, change slowly, and are relatively stable. Secondly, they both assume that the most important competitor for any company comes from other organisations within the same industry, from organisations offering similar products. The third assumption is that resources (with some exceptions) are properties of firms and are linked to them (McGrath & Kim, 2014).

This thesis argues that these assumptions do not reflect the intense and rapidly changing contexts within which a company’s competitive advantage, business model or profitability requirements are challenged more rapidly and regularly, and from different angles, than before. Factors including globalisation (Ghemawat, 2011) and the digital revolution (Yoo, Boland, Lyytinen, & Majchrzak, 2012) are reducing entry barriers, empowering new competitors (Govindarajan & Trimble, 2012), rapidly changing the balance of power in technology (Schmidt & Cohen, 2013), and creating an era of hypercompetition for firms in an increasing number of markets (Wiggins & Ruefli, 2005).

McGrath’s conception of transient rather than sustainable competitive advantage pushes firms to develop a methodology considering where to compete, how to compete and how to make profits, when competitive advantages are temporary. She also considers how to move from one wave of competitive advantage to another (McGrath, 2013a). While recognizing that there are many markets where sustainable advantage can be sustained over long periods, where taking advantage of deep customer relationships and insights in core markets continue to pay dividends, or major eco-systems with focal firms persist (Ozer & Zhang, 2015; Tomlinson & Fai, 2016), the argument is that an increasing number of existing and developing sectors, served by companies large and small, do not operate or prepare for future growth in stable markets with clear boundaries. Music, entertainment, clothes retailing, mobile phones, mobile payments and education are some of the markets where advantage can be copied quickly, and dominant technology platforms shift (McGrath, 2013a).

As will be seen in the section on cognition, the presumption of stability lets inertia into an organisation, and organisational power structures are built up around existing business models (Tellis, 2013) and leadership attention (Ocasio, 1997; Van de Ven, 1986). The assumption of little change in the future activities of people and organisations is undermined by recent work at the Oxford Martin School (Frey & Osborne, 2013) considering the future of employment. Frey and Osborne propose that technology will increasingly replace non-routine tasks such as statistical analysis replacing cancer diagnostics, prefabricated construction replacing typically dexterous building work, and driverless taxis replacing the mini-cab driver. Machines are powerful, intelligent, and they affect what people do, changing the products and services that consumed in both business to consumer (B2C) and business to business (B2B) markets. Segmentation will move from demographics and product characteristics to “jobs-to-be-done” in an increasingly service dominated economy (Christensen, Anthony, Berstell, & Nitterhouse, 2007). New categories will emerge, which McGrath prefers to see as arenas: “Characterized by particular connections between customers and solutions, not by the conventional description of offerings that are near substitutes for one another” (McGrath, 2013a, p. 9). The scope of the arenas “Will in all likelihood be the outcomes that particular customers seek (“jobs-to-be-done”) and the alternative ways those outcomes might be met. This is vital, because the most substantial threats to a given advantage are likely to arise from a peripheral or nonobvious location” (McGrath, 2013a, p. 10).

MacMillan saw transient advantage “waves” (1988). With competitive advantage being transient, the different phases need to be managed, (McGrath, 2013b), with different skills needed at different stages of the process (Tidd & Bessant, 2013). A major challenge for many firms, particularly SMEs, is that moving resources from a successful activity generating good returns in exploitation mode to re-direct them to an unproven, innovative opportunity is difficult in power terms, politically, for the organisations and individuals involved (Sull, Homkes, & Sull, 2015). Very few companies have worked out how to do this on an enduring basis (McGrath, 2012).

In accepting the arguments supporting the concept of transient advantage (McGrath & Kim, 2014; McGrath, 2012, 2013a), in disrupting environments at times of hypercompetition (Chen et al., 2010; Kriz, Voola, & Yuksel, 2014; McNamara,

Vaaler, & Devers, 2003; Peteraf, Stefano, & Verona, 2013), the management of the innovation process becomes even more critical to an organisation. The implications of transient advantage are that:

1. The development of advantage in firm, product and geographic arenas will happen in waves over shorter time periods than before (MacMillan, 1988)
2. The ability to pick up on early warnings, and to get the organisation to be vigilant to developments within the ecosystem and beyond will become more important, and will need to happen more regularly – as the advantage lasts for less time (Day & Schoemaker, 2006)
3. Strategy management in the transient context increases the importance and value of acquiring uncomfortable, disconfirming information both at the firm and individual level. This is in contrast to the confirmation bias typically found in “exploit” companies. Gourlay of Alliance Boots raises the question: “How do we make bad news travel faster?” (McGrath, 2013a, p. x).
4. The people who often see changes coming (technologists, scientists, pattern recognisers) are not the members of the board, who have the ultimate responsibility for making decisions about an increasingly changing and uncertain world (McGrath, 2013a).
5. Diversity is becoming more critical. Homogeneous teams with limited cognitive bandwidth will be increasingly flat-footed (Eggers & Kaplan, 2009; Kaplan, 2005)
6. Business strategies will need to be precise, with the driver of categorization being the outcomes that customers seek – “jobs-to-be-done”, developing different ways to deliver these outcomes (Bettencourt, Lusch, & Vargo, 2014; Christensen et al., 2007; Ulwick, 2002)
7. Most significant threats to a prevailing advantage are likely to come from peripheral or nonobvious locations (Day & Schoemaker, 2006; McGrath, 2013a)

In this section of the literature review the author has proposed that hypercompetition, and the existence of disrupting markets, threaten the traditional concept of sustainable competitive advantage and industry level analysis. The study of innovation must consider how organisations develop sustainable advantage where it is achievable, and transient advantage where they see profitable opportunities within a more limited timeframe. The pursuit of transient advantage demands detailed research at the firm and product category level.

2.11 Strategy development and implementation in complex environments

Reflections inspired by Clausewitz persuasively pinpoint how strategy is enacted in the moment (Spender, 2014), and it is relevant to the thesis to consider how strategy development, decision making and execution take place in increasingly service orientated, chaotic, global, culturally diverse and complex environments (Brown & Eisenhardt, 1997; Doz & Wilson, 2012; Rivkin & Siggelkow, 2005; Sargut & McGrath, 2011). Eisenhardt and latterly Sull have particularly driven forward research in the strategy area, considering volatile and complex environments, and how best to deal with them (Sull & Eisenhardt, 2015). Brown & Eisenhardt (1998) identified that successful firms in competitive markets have fast and high quality strategic decision making processes. They found that:

1. Leadership teams build collective intuition
2. Conflict is stimulated by assembling diverse teams who are challenged through frame-breaking exercises
3. Effective decision makers focus on maintaining decision momentum, with strategic decisions taking two – four months. If it takes longer, the decision is too big, or the group are procrastinating
4. Politicking is seen negatively, particularly because it includes withholding information

Subsequent research (Bingham & Eisenhardt, 2011) has emphasised the importance of heuristics to strategy development, supported by effective routines (Davis, Eisenhardt, & Bingham, 2009; Winter & Nelson, 1982). Strategy decision making without structure, particularly using heuristics, is not effective, even for entrepreneurial firms. Incumbent firms typically have too much decision making structure, as they tend to focus on efficiency. However, without sufficient structure, it is impossible to improvise effectively and so to capture opportunities. Davis et al. (2009) frame the challenge as being the trade-off between: “The flexible capture of widely varying opportunities vs. efficient execution of specific opportunities. Less structure opens up the organisation to the possibility of addressing a wider range of opportunities that serendipitously occur, but it also hinders the rapid, mistake-free execution of those opportunities. Conversely, more structure enables the efficient execution of particular opportunities that can be anticipated. But too much structure

is more than just too rigid. It also narrows the range of possible opportunities, suggesting that structure is most valuable” (Davis et al., 2009, p. 439). The findings of Davis et al. (2009) are key to this study, as core, adjacent and breakthrough environments are often all unpredictable at the same time. As executives plan and execute diversification into unpredictable environments, issues of how best to structure organisations in the core, and beyond the core operations are often major challenges for established organisations (Davis et al., 2009).

Davis et al. recommended reducing structure in the core, and adding structure in entrepreneurial environments (Davis et al., 2009). They also found a second, subtler challenge, which is the need for a dramatically altered mind set. This mind set entails vigilantly managing the amount of structure (not just its content), improvising to capture fresh opportunities, and quickly rebounding from mistakes at the edge of chaos, where firms can at best capture only a few opportunities and gain an unstable or dissipative equilibrium (Davis et al., 2009). Simply put, managing in unpredictable environments is different, harder, and more precarious than in predictable environments. Overall, the irony of adaptation is that, as it becomes more crucial for organisations to adapt, it also becomes more challenging to do so, due to rigidity in resource allocation and inertia within organisational routines (Gilbert, 2005; Leonard-Barton, 1992).

The relevance of Eisenhardt’s later research into the strategic decision making of incumbents is that the structure built up to manage their “exploit” operations mitigates against seeing and responding to innovation triggers from the periphery, just as the cognitive frames and attention of incumbents are generally focused on “do better” rather than “do different” opportunities.

Sull (2009) has argued that to sustain corporate renewal, organisations must develop the habit of successfully both identifying and exploiting small opportunities, so that they have the organisational capability to identify and respond to the “golden opportunities” when they arise (Sull, 2009, p. 32-35). Organisations need to seek information so that they can develop mental maps, as people and organisations cannot: “Seize the upside of turbulence by ignoring the provisional nature of knowledge. All mental maps are static representations of a shifting situation,

simplifications of a complex world made without the benefit of knowledge that will only emerge in the future. They remain always and everywhere provisional, subject to revision or rejection in light of new information” (Sull, 2009, p. 65-66).

Sull and Eisenhardt emphasise that strategic decision making does not need to be time consuming and complex, but effective (Eisenhardt & Sull, 2001; Sull & Eisenhardt, 2012; Sull & Eisenhardt, 2015), and promote the use of simple rules that evolve with the experience of the company. To support decision making using simple rules, the provision of too much information actually slows down decision making, as individuals feel overwhelmed by the choices that they face (Iyengar, 2010).

Industry clock speed influences how companies are developing and exploiting transient advantage (Lahiri & Narayanan, 2013; McGrath, 2013b; Nadkarni & Narayanan, 2007; Turner, Mitchell, & Bettis, 2012). In high clock speed industries both small and “golden” opportunities may fleetingly become opportunities to be evaluated, be grabbed by rivals, or be eclipsed by running the core business or other new opportunities.

Therefore, to support “simple rules” decision making, incumbents face a challenge as to how to move the attention of the strategy decision-makers to the issues that are critical to support both incremental (relatively easy) and radical (very hard and organisationally indigestible) decisions (Eggers & Kaplan, 2009; Ocasio, 1997). The level of complexity is also increasing, as the development of strategy management and innovation in the knowledge era is increasingly shaped by the value of collaboration and networks (Chesbrough & Appleyard, 2007; Chesbrough, 2003; Gulati, 2007).

Strategy development and implementation has become more complex (Brown & Eisenhardt, 1997; Rivkin & Siggelkow, 2005), the level of (hyper) competition is intensifying (D’Aveni, Dagnino, & Smith, 2010; D’Aveni, 1995), and the need for a company’s innovation process to deliver winning value propositions that give them transient competitive advantage has never been greater (D’Aveni et al., 2010; Hermelo & Vassolo, 2010; McGrath, 2012).

2.12 Challenges in responding to disrupted and disrupting environments

Within the extensive strategy literature, significant research has taken place to understand differences in how organisations respond to change, and the explanations have been based on differences in either incentives or capabilities. Economists have argued that the degree of response to change, e.g. technology, can be explained as rational responses to differential incentives (Henderson, 1993). RBV researchers (Barney, 1991) argue that companies often find it difficult to respond to change because of the path dependence connected with initial endowments (Leonard-Barton, 1992), unless the firm's capabilities are "pre-adaptive" (Klepper & Simons, 2000), or firms possess dynamic, managerial capabilities that allow resources to be reconfigured (Helfat, 1997; Winter, 2003; Teece, Pisano, & Shuen, 1997). The development of a firm's dominant logic also informs how narrowly incumbents can travel looking for new innovation opportunities (Prahalad & Bettis, 1986, 1995). Studies on the temporal management of innovation also reflect deep organisational habits in terms of how much innovation an organisation performs over time (Kaplan & Orlikowski, 2013; Turner et al., 2012), and how difficult it is for organisations to change the rhythm of their innovation activities.

A qualitative study of Polaroid's failure to move from analogue to digital imaging technologies highlighted the paradox of the firm's early development of technical capabilities but subsequent failure to be competitive in the digital camera market (Tripsas & Gavetti, 2000). Their contribution demonstrated that the presence or absence of capabilities was not a satisfactory explanation of organisational inertia, and that cognition was a major contributor to outcomes. Tripsas and Gavetti (2000) amplified the findings of an earlier, product development orientated study (Dougherty, 1992), which showed that the "thought worlds" of departments, and organisational product routines interact to limit the acquisition of new technology and market insights.

The attention-based view of the firm (Ocasio, 1997, 2011) argues that one group of the contextual factors influencing the allocation of attention in a firm is what Ocasio (1997) called the "rules of the game", the routines and incentive systems that structure the process and lenses through which interpretations are made.

Christensen (1997) identified the influence on attention of sales and marketing incentives to focus on immediate opportunities. Routines can be seen to respond to both cognitive and motivational elements. They embed in the organisation both an understanding of how things should be done, and what gets rewarded (Cohendet & Llerena, 2003; Dosi, Levinthal, & Marengo, 2003).

Kaplan and Henderson (2005) considered the concepts of incentives and cognition together: "To build a framework for the analysis of incentives that highlights the ways in which incentives and cognition, while being analytically distinct concepts, are phenomenologically deeply intertwined." They: "Suggest that incentives and cognition coevolve so that organisational competencies or routines are as much about building knowledge of "what should be rewarded" as they are about "what should be done" (Kaplan & Henderson, 2005). Due to the strong influence of routines on individual and organisational behaviour, they can reinforce "attention traps" (Johnson & Hoopes, 2003).

Laamanen and Wallin (2009) built on these foundations, to show how capability development trajectories aligned with the cognitive paths of managers. They found that where there are shifts in how managers thought about the business, they were able to build the required capabilities. In fact, it was the ability of managers to select which capability bottleneck to focus on which made adaptation to changing conditions possible. This connects back to Herbert Simon's observation in 1947 that: "Organisations and institutions provide the general stimuli and attention-directors that channelize the behaviors of the members of the group, and that provide the members with the intermediate objectives that stimulate action" (Simon, 1947, 100-101).

2.13 Fast Second: How do incumbents miss out the pre-diffusion stage, and successfully commercialise radical innovation opportunities?

Markides & Geroski, (2004, p.26) challenge companies to answer the question: “Where do radical new markets come from, what are their structural characteristics, and what skills are needed to create and compete effectively in them?” The full extent of what incumbents need to change to become effective pioneers is so significant that Markides & Geroski developed the notion of “Fast Second” (2004, 2005) after considering the long debated themes of first mover advantage (Lieberman & Montgomery, 1988, 1998), and the position of second movers (Boeker, 1989; Gal-Or, 1985; Kopel & Löffler, 2008; Tellis & Golder, 1996, 2002).

The “Fast Second” thesis (Markides & Geroski, 2004, 2005) is based upon innovation research findings that show that:

- Radical innovations creating new-to-the-world markets disrupt users, customers and producers
- Radical innovations are not driven by demand or immediate customer needs, but come from a supply-push process
- Radical innovations usually lack champions, as there is no other market leader, and there are no lead users
- Supply-push innovations are typically developed haphazardly, without a clear customer need, involve multiple research projects and actors, and require a long gestation process when little seems to be happening
- Radical innovations need to create user groups and niches on the periphery of established markets – and these niches initially appear unattractive to incumbents, as they are too small, and disrupt the dominant logic of the firm

However, research shows that since the second world war large firms and incumbents have introduced a majority of radical product innovations (Chandy & Tellis, 2000; Tellis, 2013). How can this be the case, considering factors influencing the successful introduction of radical innovations detailed by Markides and Geroski?

The key to unlocking this mystery is through understanding the pre-diffusion literature which explains the pathway to a dominant design. Typically small, entrepreneurial driven companies and their networks (or ecosystems) engage in exploration and development work, linking up with organisations (often incumbents) when a dominant design is in prospect. Incumbents can be highly effective as consolidators, and at choosing the right time to move. Consolidators enter a market at the right time, segment the market, build brands, create buyer loyalty, and standardise services.

Markides and Geroski (2004, p. 30) propose that incumbents: “Subcontract the creation of radical new products to the market, and for start-up firms to subcontract the consolidation of these products to big established firms.” For incumbents to work through how they might do this, consideration of the diffusion and pre-diffusion literature is informative.

The invention of new technological principles, their application in new product categories, and the subsequent diffusion of products based on these principles generally results in an erratic process that takes decades to develop (Gopalakrishnan & Damanpour, 1997; Nieto, 2003). A wide range of companies, individuals and organisations are typically involved in the process of developing and diffusing high-tech product categories. While some of the trail-blazing companies that propel these processes forward end up being very successful, many of them fail before their products can reach a mass market (Tellis & Golder, 1996; Olleros, 1986).

Rogers (2003) focused on the diffusion of products, generally considering diffusion from the demand perspective and identifying patterns of adoption for what he saw as invariant product versions. In contrast, Utterback et al. (1975; 1978; 1994) emphasise that in a new industry, the focus is generally on major product innovations. Later on, when a dominant product design has become widely accepted, the focus moves to process innovations that fundamentally change the production and distribution chain rather than the physical product. A dominant design, once established, is made up of a configuration of components that

represents the standard in a market for an extended time, as it meets the requirements of a broad range of users (Abernathy & Utterback, 1978).

Technological discontinuity comes in cycles (Tushman & Anderson, 1986; Murmann & Tushman, 1998), with a variation stage that emerges through a scientific advance or through a unique combination of existing technologies. The next stage, described as an era of ferment, sees parallel processes of substitution, competition and ongoing technical change. In the third stage, a dominant design is effectively selected by the market, with a dominant design emerging. Finally an era of incremental change sets in, with the dominant design remaining relatively unchanged. While Rogers' representation of the diffusion process is valid for many product categories, the position of Tushman and Utterback also applies in many contexts, particularly for complex technological products (Murmann & Frenken, 2006; Murmann & Tushman, 1998).

Different theories consider different factors and mechanisms to explain the variance in diffusion. Diffusion researchers such as Rogers (2003) typically explain the start and the speed of diffusion considering the characteristics of potential adopters and their perception of the innovation. Economists may focus more on legal and institutional characteristics (North, 1994). Ortt (2010) sought to unbundle the factors affecting the duration of the pre-diffusion phase, and developed a simple model of the environment within which the product is developed and adopted. He found that the most important categories of factors affecting the pre-diffusion phase in high-tech environments are:

1. The main (focal) organisation(s) responsible for the development, production, supply and use of the new product
2. The technological system required to use the new high-tech product
3. The market environment, including all the other actors (than the main organisations) and factors involved (e.g. the availability of regulations and standards).

The pre-diffusion phases has significant consequences for companies working to commercialise new high-tech products:

1. The average length of pre-diffusion phases is long (about 17 years)

Implication: Both managerial stamina and long-term financial resources are needed.

High-tech product categories require tremendous investment over long periods of time. Relevant to this study, while Reed Elsevier's 2013 full year results show their Scientific, Technical and Medical division generated 72% of revenue from electronic services (Habgood & Engstrom, 2014), it was print based revenues that funded investment in electronic services during the mid-1990s (Ware & Mabe, 2015)

2. Dispersion around the average is significant (about 15 years)

Implication: Companies can hope for shorter pre-diffusion periods, but their industry context will influence how long it takes. The more extensive the infrastructure that has to be built, the longer the adaptation phase is likely to be (Ortt, 2010)

3. A large number of factors can influence the length of pre-diffusion phases, with an average of seven factors decisive in each of Ortt's (2010) cases

Implication: Managing the erratic patterns in the pre-diffusion phases, and the complex inter-actions that affect them, particularly in the adaptation phase, demands specialised innovation management skills.

The complexity of the pre-diffusion process, allied to the difficulties encountered in opportunity recognition and opportunity evaluation, confirms that incumbents contemplating radical innovation have difficult decisions to make about the relationship between structure, performance and the business ecosystem (Davis et al., 2009; Hill & Birkinshaw, 2008, 2012). Entrepreneurial business approaches in smaller companies or corporate venture units can be allied to the power to consolidate opportunities possessed by incumbents (Hlavacek, Dovey, & Biondo, 1977; Hoang & Rothaermel, 2010; Meyer & Ruggles, 2002; Olleros & Macdonald, 1988; Quinn, 2000).

This review of the diffusion and adoption literature has been particularly informative to the research project because the product focused innovation search and select processes link with the product development and market launch phases. The pre-diffusion stage is part of the exploration process within a business ecosystem. As the

adoption of open innovation and agile MPV processes increases, search, select and the pre-diffusion stage are becoming increasingly interconnected. The pre-diffusion phase can be protracted and uncertain, and incumbent “consolidator” organisations need to work out what mix of organisational approaches will work best to explore beyond the core.

2.14 Cognition

This section considers how organisations and their managers develop cognitive schemas to simplify the often overwhelming range and quantity of stimuli that they encounter, and how their cognitive frames affect their response to innovation signals.

Organisations and individuals observe relevant environments, watching for opportunities, such as competitors stealing their position, new technologies, or suppliers working with competitors. They look for what they sense is relevant, constructing frames to simplify their environment. The construction and evolution of these frames gives stability and focus, helping to define their organisation’s “innovation space” (Francis & Bessant, 2005).

Weick and Daft (1984) considered the questions and answers needed to make strategic and operation decisions: “Building up interpretations about the environment is a basic requirement of individuals and organisations. The process of building the interpretation may be influenced by such things as the nature of the answer sought, the characteristics of the environment, the previous experience of the questioner, and the method used to acquire it” (Weick & Daft, 1984, p.284).

The importance of sensemaking to an organisation’s strategy, and its’ successful management of the innovation process, is adroitly summarized by Weick, Sutcliffe, & Obstfeld (2005, p.409): “Sensemaking involves turning circumstances into a situation that is comprehended explicitly in words and that serves as a springboard into action.” They continue: “The seemingly transient nature of sensemaking belies its central role in the determination of human behaviour, whether people are acting in formal organisations or elsewhere. Sensemaking is central because it is the primary site where meanings materialize that inform and constrain identity and action”

(Weick, Sutcliffe, & Obstfeld, 2005, p. 409). For organisations and individuals to function, they have to make sense of their environment so that they can make decisions, and so it is clear that sensemaking plays a central role in the innovation search process through which organisations identify and respond to innovation signals.

Incumbents can become overly industry and competitor focused, as demonstrated by a key study of Scottish knitwear companies, where the researchers found that most of the managers thought only of other Scottish knitwear manufacturers as their competition, rather than firms from the rest of the UK or other countries (Porac, Thomas, & Baden-Fuller, 1989). Abrahamson and Fombrun (1994, p 728) identified how entire industries can have: “A distinct propensity to overlook radically new types of competitors, cling to traditional technologies, and remain mired in similar, yet outdated, strategic postures.” Their research put the failure to adapt at industry levels down to both the microcultures of single organisations, and what they termed inter-organisational "macro-cultures", which are relatively idiosyncratic beliefs that are shared by managers across organisations within a sector. They also proposed that “value-added networks linking organisations into collectives both induce and reflect the existence and persistence of more or less homogeneous macrocultures. In turn, homogeneous macrocultures (a) increase the level of inertia these organisations experience, (b) influence the inventiveness of organisations and the diffusion of innovations among them, and (c) increase the similarity of member organisations' strategic profiles” (Abrahamson & Fombrun, 1994, p. 728).

Hambrick and Mason (1984) argued that both strategic choices and organisation performance are associated with the characteristics of the top managers in a firm. This "upper-echelons theory" was based on the premise that top managers structure decision situations to fit their view of the world. They argued that to understand the decision making and strategy of an organisation, it is important to identify those factors that direct or orient executive attention (Hambrick & Mason, 1984). Early work on top management teams used demographic measures to identify cognitive constructs in areas such as risk taking and readiness to change (Finkelstein & Hambrick, 1990). However, demographic approaches failed to help understanding of the causality of cognition.

A major literature review (Walsh, 1995) helped to define and structure future research in the area of cognition: “As a basis for better understanding of the role of knowledge structures in the management of organisations, we identified 10 areas of needed research in the broad areas of knowledge structure representation (i.e., halt purely descriptive studies, push our assumptions about veridicality, blend our interests in content and structure, and move beyond individual minds in our considerations of supra-individual knowledge structures), use (i.e., beware the fallacy of the wrong level, understand the boundary conditions of use, and reconsider cross-level consequences), and development (i.e., reconsider the utility of change, examine the place of forgetting, and investigate the social and emotional bases of change)” (Walsh, 1995, p. 311).

Research responded to the agenda suggested by Walsh, with one stream of research built on the concept of bounded rationality, recognising that cognitive frames exist but seeking to understand how well the views of managers represent the competitive landscape. Inaccuracies can be ascribed to the kinds of perceptual biases identified by cognitive psychologists (Kahneman & Tversky, 1979; Kahneman, 1992, 2011; Tversky & Kahneman, 1981).

A study of deregulation in the airline industry (Cho & Hambrick, 2006) showed how changes in a top management team’s focus of attention were connected to changes in strategic actions. They also identified a series of antecedents to alterations in top management team attention, such as changes in the average industry experience of the leadership team, changes in functional experience, and increases in the heterogeneity of the leadership team.

During the 2000s, cognition researchers tried to develop a fuller empirical understanding of the ways that cognition shapes action. Positive steps were taken in the understanding of how organisations respond to changes in their environment, be these changes technology, social, market crises or demographically driven (Kaplan, 2011). Some organisations adapt effectively, but many are in the grip of strong inertial forces (Gilbert, 2005; Tellis, 2013). Cognitive explanations have been particularly helpful in understanding how organisations respond to changes in their

environment. Kaplan (2011) identified two major areas where research into cognition could increase the understanding of strategy:

1. Incentives and capabilities
2. Looking inside the organisation to reveal the daily routines and practices that connect cognitive frames to outcome

Work by Eggers and Kaplan in the fibre optics sector showed that the effects of cognition, incentives and capabilities are linked (Eggers & Kaplan, 2009; Kaplan, 2008a). Regarding R&D, Kaplan considered that changes in managerial attention did have an important main effect, and this effect was greater if organisations did not have customer driven incentives to distract them. This finding implies that while having the appropriate capabilities or powerful incentives to act may improve a firm's chance for responding to environmental change, these incentives and capabilities on their own may not be enough to make the change happen. In line with the findings at Polaroid (Tripsas & Gavetti, 2000), even when a firm has the necessary technical capabilities, it might not be able to respond to a new technology if the beliefs of a manager or management team are not aligned correctly with the opportunity. Similarly, if the incentives are low – such as diverting investment to longer term projects causing a CEO to miss out on financial incentives, cognition will have an increasingly substantial effect on outcomes.

In their study of the optical product sector (Eggers & Kaplan, 2009), the impact of how the CEO's cognition differs was explored, depending on the focus of their attention. For example, entry into new arenas was accelerated when attention was focused on emerging technology, and the response slowed when the focus was on existing technology. The implication from this research is that firms with the same underlying organisational capabilities and incentives can move in different directions if the CEO's attention is either short or long sighted. It is therefore not just the organisational capabilities or incentives connected to existing technologies that hold incumbents back, but rather greater attention to existing technologies and routines. The work of Eggers and Kaplan (2009) indicates that understanding the interaction between incentives and cognition ends up being central to understanding strategic outcomes in an organisation, influencing how organisations approach focal, adjacent and more peripheral opportunities.

The cognition literature informs the research project, as organisational cognition affects where incumbents search for innovation signals, and how they respond to them, considering:

- The importance of sensemaking to an organisation's innovation process, as it creates the understanding that serves as the springboard for decision making
- The influence of the attention of leaders on where organisations allocate resources, particularly innovation search resources
- The preparedness of incumbent management teams to be ambidextrous, and sense and respond to signals from both the focal and peripheral areas of their business
- What actually gets incumbents to shift their attention to the periphery, where disruption typically comes from?
- How cognition limits the strategic response of incumbents to threats and opportunities, bearing in mind Sull's (2009) identification of the need to develop routines to take advantage of the "Inverse power law of opportunities"

2.15 Innovation portfolio management managed on a core, adjacent and breakthrough basis

Innovation opportunities, new markets, and frequently threats to incumbents, particularly present themselves under discontinuous conditions (Utterback, 1994).

The danger for incumbents is that innovation momentum builds up outside the "normal" search arena, and by the time that they are visible to them they have limited or compromised reaction time and capabilities (Christensen et al., 2004; Schoemaker et al., 2013; Tellis, 2013).

Where there are stable markets, "do better" innovation is appropriate, and there are well established approaches for managing evolutionary product and service development (Baines, Fill, & Page, 2011; Cooper, 2011; Slack, Brandon-Jones, & Johnston, 2013). Strong connections with existing customers are developed, and the system delivers a regular flow of incremental product improvements (Greer & Lei, 2012; MacMillan & Selden, 2006).

The move to transient competitive advantage environments (McGrath, 2012) means that, in contrast to the planning processes described by Ansoff (1957, 1965) and Porter (1985, 2008), the general manager or leader managing the strategy process has to balance both the strategy and innovation processes, acting as an orchestrator to develop a range of new product development options (Anand, Oriani, & Vassolo, 2015; McGrath & MacMillan, 1995) across core, adjacent and breakthrough environments (Day, 2007; Nagji & Tuff, 2012).

In fast-moving environments, new products are far more likely to fail than to succeed (Klingebiel & Rammer, 2014). Nielsen, the market research group, recently found that only 18 out of 8,500 new product launches in the consumer goods industry could claim to be a breakthrough innovation (Daneshkhu, 2015). Despite the odds often being stacked against successful NPD, competitive pressure and the need for new profit streams demand that companies invest in product focused innovation, even though little is often known about the likely costs and commercial returns (Brown & Eisenhardt, 1997; Hauser et al., 2006; Klingebiel & Rammer, 2014).

R&D groups, and even market sensitive new product development teams, can have inflexible and slow design and development processes, and they are often poorly equipped to respond to the unexpected. Dynamic product portfolio management techniques (Day, 2007; Eggert, 2012; Nagji & Tuff, 2012) supported by project portfolio management (Heising, 2012; Killen & Hunt, 2013) and agile design processes enable organisations to re-prioritise projects and re-allocate resources regularly, helping them to anticipate and respond to changes in their markets (Morris, Ma, & Wu, 2014). Portfolio management tools enable R&D groups to identify and prioritise the product ideas that warrant the greatest funding and attention at different times (Radjou & Prabhu, 2015).

There are four main goals for portfolio management: 1) To maximise the value of a given resource expenditure; 2) Balance the right mix of projects; 3) To achieve a strategically aligned portfolio; 4) To manage the right number of projects for the resources available (Cooper et al., 2001; Cooper, 2013). Central to all product development is uncertainty about technological complexity, adoption, the actions of competitors and even partners (Adner, 2013). Innovation portfolio decisions are

therefore taken under uncertainty, and organisations strive to reduce this uncertainty to increase success rates and limit costs and wider organisational waste (Cooper, Edgett, & Kleinschmidt, 2004).

NPD projects are typically viewed as involving high levels of novelty, complexity and dynamism, and these factors lead to the characterisation of NPD as a high reward but high risk activity (Nagji & Tuff, 2012; Zedtwitz et al., 2014), with risk management an essential capability for the successful management of NPD (Kwak & LaPlace, 2005; Mu et al., 2009).

A wide range of portfolio management matrices exist (Tidd & Bessant, 2013; Zedtwitz et al., 2014), including some developed and promoted by consultants including the McKinsey Matrix (Henderson, 1970; Kiechel, 2010).

The effectiveness of different strategies for the allocation of resources to innovation projects enable organisations to manage this challenge (Klingebiel & Rammer, 2014). The allocation of resources is a key activity for managers building an product innovation portfolio, with a developing literature exploring how differences at the organisational level concerning the strategic management of innovation influence performance (Cassiman & Veugelers, 2006; Laursen & Salter, 2006; Leiponen & Helfat, 2010, 2011; Li & Atuahene-Gima, 2001).

The effective use of processes for screening and managing ideas is significantly related to the successful pursuit of radical innovation (Oke, 2007). Connecting ideation, selection, and project portfolio management increases the rate of return a firm can secure from its innovation resources, supporting the investment of money, time and intelligence in the earlier stages of innovation projects (Reid & de Brentani, 2004; Verworn, Herstatt, & Nagahira, 2008). Heising (2012) developed the concept of “ideation portfolio management”, as there is typically a lack of integration between these two phases (Khurana & Rosenthal, 1997).

Research has found that innovation performance increases the wider that firms search for opportunities (Laursen & Salter, 2006; Leiponen & Helfat, 2010). The assumption that a wider range of opportunities increases innovation performance is

implicit in the conceptual models of the NPD process (Cooper et al., 2001; Ding & Eliashberg, 2002). The literature also identifies disadvantages for firms exploring a larger number of opportunities, including the reduction of attention given to individual projects, greater organisational complexity, loss of strategic focus, and reduced incentives (Boudreau, Lacetera, & Lakhani, 2011; Sull, 2003).

Organisations with greater innovative intent within their NPD portfolio typically have a larger proportion of novel projects, at a relatively long distance from the company's existing capability and knowledge base, posing a challenge for the allocation of limited resources (Klingebiel & Rammer, 2014). While the outcomes of incremental innovation are relatively predictable (Tidd & Bessant, 2013), organisations undertaking more radical NPD regularly experience limited sales on new launches, even if the returns on the infrequent successes are higher (Hauser et al., 2006; Moore, 1998; Shane & Ulrich, 2004). The importance of the selection process to firms with higher innovative intent (i.e. those pursuing radical innovation) and their correspondingly broad innovation portfolios is clear, otherwise the commercialisation of products suffers. An additional factor when considering the breadth of innovation portfolios is that greater learning happens in uncertain environments (Eggers, 2012; Huchzermeier & Loch, 2001).

Innovation efforts are prone to failure, including well resourced initiatives. Klingebiel & Rammer (2014) found that increasing the quantity and quality of resources dedicated to the NPD process does not meet the challenge of lowering the uncertainty implicit in innovation activities beyond the core. A company's innovation performance also depends on the allocation of resources to projects. Breadth positively influences performance, independent of resourcing, with the effect greater for companies allocating resources selectively and for those with greater innovative intent (Klingebiel & Rammer, 2014). The breadth of resource allocation increases innovation performance more than the intensity of resource allocation, particularly with more novel products. The degree of ambition of an organisation, as revealed in its' innovation portfolio, boosts new product sales through adopting a broad approach to the product portfolio, if resources are allocated selectively (Klingebiel & Rammer, 2014).

Timing also has a major impact on outcomes, as there are major disadvantages of breadth later in the NPD process, where resource commitments are more demanding, and concurrent learning capacity is limited (Eggers, 2012; Klingebiel & Rammer, 2014). Effective innovation portfolio governance, including formality and explicitness, information support and the frequency of reviews all positively influence innovation outcomes (Urhahn & Spieth, 2014).

The research question: “How do organisations manage search and select in disrupting environments?” is at the heart of the research project. Whether organisations manage their search and select activities guided by a high level, portfolio driven strategic plan supported by appropriate structures considering core, adjacent and breakthrough (or transformational) environments emerges as a key capability warranting further exploration through the research project.

2.16 Dynamic capabilities

The study of strategic management is primarily concerned with how companies develop and sustain competitive advantage. The RBV argues that resources which are simultaneously valuable, rare, inimitable and nonsubstitutable (VRIN) are a source of competitive advantage (Barney, 1991, 1996). Both practitioners and academics are concerned with how organisations change, sustain and develop competitive advantage, with Ambrosini and Bowman (2009) arguing that despite other fields being concerned with change-orientated themes (e.g. organisational learning, cognition), only the dynamic capability school specifically addresses how companies can change their resources persistently. While Teece and Pisano can be seen as the key early proponents of the dynamic capabilities perspective, their contributions have built on Nelson and Winter’s (1982) *An Evolutionary Theory of Economic Change*, which considered the role of routines and their influence on how companies adjust to changing environments while pursuing growth.

In the early stages of the development of the dynamic capabilities field, Teece and Pisano emphasised that strategic management is chiefly about: “Adapting, integrating and reconfiguring internal and external organisational skills, resources and functional competencies toward the changing environment” (Teece & Pisano,

1994, p. 537). The importance of changing environments, and the difficulties which organisations had in responding to them (Harreld, O'Reilly, & Tushman, 2007) influenced a change of the definition to: "The firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (Teece, Pisano, & Shuen, 1997, p. 516). A somewhat more dramatic definition suggests that dynamic capabilities are: "The firm's processes that use resources – specifically the processes to integrate, reconfigure, gain and release resources – to match or even create market change. Dynamic capabilities thus are the organisational and strategic routines by which firms achieve new resources configurations as markets emerge, collide, split, evolve and die" (Eisenhardt & Martin, 2000, p. 1107), and this definition is particularly appropriate to the research project, seeing that the case companies operate in disrupting environments.

A useful summary by Teece regarding dynamic capabilities is found in the foreword to "Winning the long game" (Krupp & Schoemaker, 2014, p. ix - x) : "A firm's dynamic capabilities rest on two pillars: (1) the vision and leadership skills of managers, and (2) the cohesion and flexibility of the organisation as a whole." He continues: "One way to think about dynamic capabilities is to divide them into three groups of activities at which successful firms must excel:

- *sensing* needs, threats and opportunities in a timely fashion
- *seizing* attractive possibilities by mobilizing resources, and
- *transforming* the organisation to maintain its effectiveness"

A debate exists in the academic literature regarding the blurry line between capabilities and dynamic capabilities. For the purpose of this study, let us presume that if an organisation has a specific "capability", this implies that the organisation (or its constituent parts) has the : "Capacity to perform a particular activity in a reliable and at least minimally satisfactory manner" (Helfat & Winter, 2011, p 1244).

Contrasting with capabilities, a dynamic capability enables a firm to alter how it currently makes its living (Eisenhardt & Martin, 2000; Helfat & Winter, 2011b; Zollo & Winter, 2002). Firms can use dynamic capabilities to extend and modify how they make a living, which can include adjusting operational capabilities (Winter, 2003), the resource base of the organisation (the things on which firms draw to carry out

activities) (Helfat et al., 2007), or the external environment (Teece, 2007). Dynamic capabilities include conducting acquisitions and NPD, which change how companies make their living (Eisenhardt & Martin, 2000; Helfat, 1997a; Helfat et al., 2007).

Dynamic capabilities relate to the ability to reconfigure, integrate and build operational capabilities (Helfat & Peteraf, 2003; Mishra, Devaraj, & Vaidyanathan, 2013; Teece, 2007). Operational capabilities support the development, production and delivery of products (Kaplan & Norton, 2008), and are sometimes described as the: “How we earn a living now” capabilities (Winter, 2003, p. 992), and can directly affect firm performance (Devaraj, Krajeski, & Wei, 2007; Rosenzweig, Roth, & Dean, 2003).

There is a complex relationship between operational efficiency and strategic flexibility, and it is useful to build on the dynamic resource-based view of the firm (Helfat & Peteraf, 2003; Helfat et al., 2007; Teece, 2007; Winter, 2003) to emphasise the role of operational capabilities and their influence on dynamic capabilities and firm performance (Helfat & Peteraf, 2003).

The research project is deeply concerned with the dynamic capabilities that need to be present in organisations to manage search and select in disrupting environments, so that they can sense needs and opportunities, seize possibilities and transform the organisation to maintain and increase its effectiveness (Krupp & Schoemaker, 2014, p. ix - x).

2.17 Ambidexterity

A recent annual report from Procter and Gamble’s highlighted the organisation’s aim: “To deliver growth among the best in our industry, we’re strengthening our core business, renewing our focus on discontinuous innovation, and implementing a \$10 billion productivity program” (*Procter & Gamble 2012 Annual Report*, 2013).

Organisations competing in different categories in complex geographic and cultural contexts face similar contradictions which require ambidexterity, being the ability to explore new avenues and exploit existing capabilities and markets.

Duncan (1976) first used the term “ambidextrous organisation” in a book chapter to describe the "dual structures" that firms often put in place to manage activities requiring different time horizons and managerial approaches. The term was resurrected two decades later focused on understanding how companies can manage sustaining and revolutionary change processes simultaneously (O'Reilly & Tushman, 1997; Tushman & O'Reilly, 1996), and the emphasis was on structural separation between evolutionary and radical change. While some research progress was made in the area of organisational learning (Levinthal & March, 1993), and balancing efficiency and flexibility (Adler, Goldoftas, & Levine, 1999), ambidexterity did not fully catch the interest of academic researchers until Birkinshaw and Gibson (2004b) used ambidexterity as a frame for the tension between alignment and adaptability, and introduced the notion of contextual ambidexterity, as distinct from Duncan (1976) and Tushman and O'Reilly's structure-orientated approach to ambidexterity.

March (1991) argued that sustained firm performance is associated with the organisation's ability to balance exploitation with exploration, and this fundamental insight has been supported through the results of a substantial body of research (Andriopoulos & Lewis, 2009; Eisenhardt & Martin, 2000; Gilbert, 2005; He & Wong, 2004; O'Reilly & Tushman, 2008; Rivkin & Siggelkow, 2003). Innovation streams, which represents the capability of an organisation to undertake radical and sustaining innovation, is one means to operationalise ambidexterity (Benner & Tushman, 2003; Birkinshaw & Gibson, 2004b). Another route to ambidexterity is through alliances, joint ventures, acquisitions or venturing (Rothaermel & Alexandre, 2009; Van de Ven et al., 1999). The organisational structures best suited to manage the strategic challenges connected with the pursuit of a range of innovation types remain the focus of research and debate (Birkinshaw & Gupta, 2013; Davis et al., 2009; de Visser et al., 2010; Gupta, Smith, & Shalley, 2006; Hill & Birkinshaw, 2012; Raisch, Birkinshaw, Probst, & Tushman, 2009).

Mudambi and Swift (2014) found that the companies that make the step between exploitation and exploration perform better. However, Swift (2015) found that a significant proportion of firms fail to make the change, or die in the process. He was: “Able to observe firm performance as firms are making the attempt to transition

between these opposing forms of R&D-based innovation, and observe organisational mortality rates as the process unfolds...(which)... shows that the magnitude of compact, significant changes in R&D spending, in either direction, is associated with a higher incidence of firm mortality. These results are found after controlling for organisational failure that is attributable to the firm's financial health, and whether the firm is currently practicing exploration, exploitation, or simultaneous ambidexterity" (Swift, 2015, Early View, page number not available). The ability of the firm to manage both exploit and explore can be a matter of organisational life and death.

Tushman et al. (2010) identified four main approaches to the design of organisations regarding their capability to exploit and explore:

1. Due to senior team and overall organisational inertia, incumbents sustain current technologies and customers (Christensen & Bower, 1996; Hill & Rothaermel, 2003)
2. Successful innovation uses interdependencies across business units through explicit linking mechanisms, and is contingent on task interdependencies (Gresov, 1989; Wheelwright & Clark, 1992). Exploratory innovation takes place in cross-functional teams led by project managers, reporting in to a senior team
3. Ambidextrous designs consistent with the different requirements of exploit and explore, with integrated structures that are inconsistent with each other (Govindarajan & Trimble, 2005; O'Reilly & Tushman, 1997). Highly differentiated structures are linked though senior team integration
4. Structures that temporally switch between looser designs for exploration and mechanistic designs for exploitation. This is a switching form of ambidexterity. Senior teams support these inconsistent structures to deal with the tensions experienced as structures change across explore and exploit (Nickerson & Zenger, 2002; Siggelkow & Levinthal, 2003)

Tushman et al's (2010) identification of organisational design alternatives to support ambidexterity is helpful, but despite a significant literature on the benefits of successfully managing both exploration and exploitation (Raisch et al., 2009; Rivkin & Siggelkow, 2003), there is no one organisational approach that seems to offer a solution to the wide variety of ambidextrous challenges facing firms.

Following the conception of contextual ambidexterity (Birkinshaw & Gibson, 2004b), academic research into ambidexterity intensified (Boumgarden, Nickerson, & Zenger, 2012; Hill & Birkinshaw, 2012; Jansen, Simsek, & Cao, 2012; Tushman, Smith, Wood, Westerman, & O'Reilly, 2010), with the concept applied to a range of phenomena e.g. venture units, alliances, individuals and teams (Birkinshaw & Gupta, 2013).

Birkinshaw and Gupta (2013) summarise ambidexterity as the ability to do two things equally well. The concept is regularly applied to the evaluation of the capability of an organisation to manage the mutually complex – but not irreconcilable – imperatives to manage both exploitation and exploration (March, 1991). The theory of ambidexterity: “Says that managers are making choices and trade-offs among competing objectives, and when they do their job well they override the organisation’s tendency to go down the path of least resistance” (Birkinshaw & Gupta, 2013, p. 293). They see ambidexterity being achieved through managerial capability, in the face of self-reinforcing behavioural routines (March, 1991), the dominant logic of the firm (Prahalad & Bettis, 1995), and how executives deal with paradox (Andriopoulos & Lewis, 2009). Ambidexterity is a multi-level construct, with different forms of corporate venture unit being deployed (Hill & Birkinshaw, 2012) to enable organisations to develop a portfolio of commercial activities.

A tension always exists between focusing on alignment and exploitation, with the prospect of short term results, and adaptability and exploration to develop options for the future (Birkinshaw & Gibson, 2004a; McGrath, 1997). BCG has developed an Adaptive Advantage Index to measure how well companies adapt to turbulence in their environment, identifying the firms that outperform in their sector in both stable and turbulent periods (excluding financial firms due to government intervention) (Reeves, Love, & Mathur, 2012). On this measure of ambidexterity, i.e. having the capabilities to succeed in both stable and turbulent periods, the most ambidextrous firms outperformed the market by 10 to 15 percent of total shareholder return on average between 2006 and 2011. This outperformance required the combination of modes of thinking and acting that can be diametrically opposed (Reeves et al., 2015, p. 177), demonstrating that ambidexterity is a valuable dynamic capability (Reeves, Love, & Mathur, 2012).

The structural and resource attributes of an organisation significantly influence performance, with better results when the corporate venture unit is better resourced, with a greater degree of decentralisation (Jansen et al., 2012). Competing objectives can be managed in many different ways, with ambidexterity scholars seeking to understand how firms transit between exploration and exploitation (Swift, 2015), and how to deliver the highest level of achievement in terms of exploitation and exploration simultaneously (Birkinshaw & Gupta, 2013; Boumgarden et al., 2012). Major tensions continue to exist between exploitation and exploratory innovation routines, and there is still a lack of understanding of the micro-mechanisms that enable ambidexterity at both the individual and organisational level (Turner, Swart, & Maylor, 2012).

2.18 Open Innovation

The concept of open innovation (OI) has gained considerable prominence in innovation management over the last fifteen years (Alexy & Dahlander, 2014). The term was initially promoted by Chesbrough, who defined it as: “The use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively. Open innovation assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they look to advance their technology” (Chesbrough, 2006, p.1). The concept is closely related to other fields within innovation management such as cumulative innovation (Murray & Mahony, 2007) and user innovation (Lilien, Morrison, Searls, Sonnack, & von Hippel, 2002; von Hippel, 1986, 2001a).

At the start of the development of the concept of openness is the notion that a single firm cannot innovate in isolation (Dahlander & Gann, 2010). To survive and grow it must connect with different actors to acquire knowledge and resources to compete with rival organisations (Chesbrough, 2003; Laursen & Salter, 2006). The concept has stimulated debate about the permeability of an organisation’s boundaries where ideas, resources and individuals flow in and out of organisations (Dahlander & Gann, 2010). External actors can exploit a company’s internal R&D investments through

combining hitherto separate silos of knowledge and capabilities (Fleming, 2001; Hargadon & Sutton, 1997).

Research has shown that OI activities can positively influence financial performance and market value (Stam, 2009; Waguespack & Fleming, 2009). The notion of OI has a simplicity that appeals to practitioners, supported by well publicised success such as P&G's respected "Connect + Develop" programme (Huston & Sakkab, 2006; Lafley & Martin, 2013; *Procter & Gamble 2012 Annual Report*, 2013). GSK's "Centre for Excellence in External Drug Discovery" (CEEDD) oversees a pipeline of options on drugs in development by external companies that challenges its in-house pipeline. While GSK has over 10,000 employees directly engaged in R&D, CEEDD has a mere 20 (Alexy, Criscuolo, & Salter, 2009). In contrast to the success of OI at P&G and GSK, firms can find it difficult to benefit from unsolicited ideas due to volume, low quality and IP issues (Alexy, Criscuolo, & Salter, 2012).

As a vibrant area of research, the field of OI has benefitted from attempts to consolidate emerging themes, particularly as the use of the term OI varies. Dahlander and Gann (2010) have updated earlier work (Gassmann & Enkel, 2006) to identify two forms of inbound innovation – Acquiring and Sourcing – in addition to two forms of outbound innovation – Selling and Revealing, which are briefly summarised below.

The inbound acquiring of inputs typically involves payment through licensing, or acquiring knowledge from actors outside the firm as a part of inbound innovation. Firms are challenged to evaluate and combine external knowledge with internal expertise effectively. Companies will often find that it is cheaper to buy in technology than to develop it themselves (Alexy & Dahlander, 2014). Studies have found that OI approaches are also used in low-tech industries, with organisations using external research to complement rather than as a replacement for internal R&D (Chesbrough & Crowther, 2006).

Sourcing is a key inbound innovation activity, considering how firms explore their environment to support their internal knowledge development. Additional knowledge may be required due to a lack of assets such as equipment or skilled employees

(Chesbrough, 2003). They might be looking for knowledge or capabilities that are easily accessible to competitors (Jeppesen & Lakhani, 2010). von Hippel's research has shown how lead users support the generation of new knowledge (von Hippel, Ogawa, & de Jong, 2011; von Hippel, 2001). There are limits to the utility of knowledge sourced externally, with too little or excessive use of external knowledge sources having a U-shaped effect on innovation performance (Alexy & Dahlander, 2014; Laursen & Salter, 2006). Fey and Birkinshaw (2005) found that the governance mode applied to external R&D, and openness to new ideas affected R&D performance.

Selling is an outbound activity in the Dahlander and Gann overview, and includes the selling or licensing of IP, with companies such as ARM Holdings, Dassault and SAP taking this approach to sharing their knowledge with others (Williamson & De Meyer, 2012). External technology commercialisation is not always fully exploited, but has significant potential if implemented successfully (Lichtenthaler & Ernst, 2007). Proprietary platform companies such as Apple, IBM and Sun Microsystems support open source technologies within their platform strategies through balancing appropriation and appropriability (West, 2003).

Revealing is also an outbound activity, undertaken when firms can secure value from its adoption by others (von Hippel, 1988). Firms reveal their knowledge selectively, when they have calculated that it is advantageous to them (Alexy, George, & Salter, 2013; Henkel, 2006). In the area of information technologies, the development and adoption of a standard might increase the overall size of a market, increasing revenue potential in the future (Adner, 2013; von Hippel, 1988).

Markets for ideas can be seen as repugnant (Roth, 2008), with some fields rejecting the private ownership of knowledge. The "open science" movement (Gans & Stern, 2010; Woelfle, Olliaro, & Todd, 2011) seeks to publish open research, campaigning for open access, with the aim of making it easier to publish and communicate scientific knowledge. "Open source software (OSS)" (Hertel, Niedner, & Herrmann, 2003; Mahony, 2003) is based on voluntary contributions from software developers and has its roots in collective action for social movements. Hertel et al. (2003) found that the motivation processes within OSS projects: "Seemed to be driven by similar

motives as voluntary action within social movements such as the civil rights movement, the labor movement, or the peace movement” (Hertel et al., 2003, p. 1174).

The idea of openness is particularly important to this HE publishing focused research study, as the OA movement within academia has had a major influence on changing the business models used within the HE publishing sector. OA is the term used widely to refer to unlimited online access to scholarly articles and other HE researcher generated content (Laakso et al., 2011). The argument made by the public bodies and charities funding research is that with the internet enabling low-cost distribution of digital content, that there should be no restriction on access to public and charity funded research (Courant, O’Donnell, Okerson, & Taylor, 2010; Laakso et al., 2011; Lipman, 2010). OA models have become commonplace within HE publishing over the last fifteen years, particularly in STM subjects (Archambault et al., 2013; Ware & Mabe, 2015), bringing both new business models and new low cost operators (Laakso et al., 2011; Morgan, Campbell, & Teleen, 2012).

2.19 Business Models

In the last twenty years interest in the concept of the Business Model (BM) has increased rapidly, with Zott et al. (Zott, Amit, & Massa, 2011) observing a marked increase in the use of the term between 1995 and 2010, alongside the widespread adoption of the internet by both the providers and consumers of products. A BCG study revealed that business model innovators were six per cent more profitable than their competitors who focused on product and process innovation over a five year period, with 14 of the 25 most innovative firms globally being BM innovators (Lindgardt, Reeves, Stalk, & Deimler, 2009). A 2012 IBM study found that industry outperformers innovate their BM twice as often as underperformers (*Leading Through Connections: Insights from the IBM Global CEO Study*, 2012).

While Teece (2010) recognised that BMs have played a central role in economic behaviour since the pre-classical era, until the mid-1990s companies tended to follow a similar logic to the industrial firm, where a product/service produced by the firm (in conjunction with suppliers) is delivered to customers who pay for it, creating

revenues. While there have always been a variety of BMs (Gassmann, Frankenberger, & Csik, 2014; Osterwalder & Pigneur, 2010), it is only over the last twenty years that BMs have increased in widespread importance for both practitioners and academics (Massa & Tucci, 2014). The rise in importance of BMs has been enabled by the development of the internet (Amit & Zott, 2001; Timmers, 1998), with entire new business sectors developing along dramatically new innovation paths that offer new logics for value creation and consumption (Massa & Tucci, 2014).

Magretta (2002) suggests that a business model answers Drucker's questions concerning: (1) who is the customer, (2) what does the customer value, (3) how do we make money in this business, (4) what is the economic logic explaining how the firm delivers value to customers at an appropriate cost? Gassmann et al., (2014, p. 6) propose a "magic triangle addressing:

1. The customer – who are our target customers?
2. The value proposition – what do we offer to customers?
3. The value chain – how do we produce our offerings?
4. The profit mechanism – why does it generate profit?

Rosenbloom and Chesbrough (2002, p. 533-4) have suggested that a BM:

- Articulates the value proposition (i.e., the value created for users by an offering based on technology)
- Identifies a market segment and specifies the revenue generation mechanism (i.e. users to whom technology is useful and for what purpose)
- Defines the structure of the value chain required to create and distribute the offering and complementary assets needed to support position in the chain
- Details the revenue mechanism(s) by which the firm will be paid for the offering
- Estimates the cost structure and profit potential (given value proposition and value chain structure)
- Describes the position of the firm within the value network linking suppliers and customers (incl. identifying potential complementors and competitors)

- Formulates the competitive strategy by which the innovating firm will gain and hold advantage over rivals.

In addition to the impact of the internet, two other phenomena have triggered significant innovation in how firms conduct business (Casadesus-Masanell & Ricart, 2010). Firstly, the onset of post-industrial technologies (Perkmann & Spicer, 2010), and efforts to reach customers at the “Bottom of the Pyramid” (Prahalad, 2004b; Radjou & Prabhu, 2015). Arguably a third phenomena can be added, being “sustainability” (Nidumolu, Prahalad, & Rangaswami, 2009; Seebode, Jeanrenaud, & Bessant, 2012).

Initially, BMs can be conceptualised as explaining the rationale of how organisations create, deliver and capture value with a network of exchange partners (Osterwalder, Pigneur, & Tucci, 2005; Zott et al., 2011). The literature overlapping innovation management and the BM concept sees two complementary roles for the BM in enabling innovation (Massa & Tucci, 2014). Firstly, BMs support the commercialisation of new technologies and ideas (Chesbrough & Rosenbloom, 2002). Secondly, organisations can also see the BM inherently as a means of innovation, and as the basis for competitive advantage (Zott & Amit, 2007). The second view suggests that organisations can compete through their BMs, and that this emerging dimension of innovation can enable category beating performance in both mature and developing industries (Zott & Amit, 2007), with firms such as Southwest airlines, Dell and Apple outperforming their competition through innovative BMs (“700-billion-dollar baby,” 2015; Dell, 1993; Lindgardt et al., 2009).

The design of new business models is complex and uncertain. The uncertainty does not just stem from the entrepreneur’s inability or lack of knowledge about how customers and the wider eco-system may respond (Massa & Tucci, 2014), but also due to the wide range of potential combinations between the components, activities and choices involved in the BM (Casadesus-Masanell & Ricart, 2010; Zott & Amit, 2010). The development of BMs cannot be fully planned, as they take shape through a discovery-driven process involving experimentation and prototyping (McGrath, 2010; Sosna, Trevinyo-Rodriguez, & Velamuri, 2010).

Many new BMs fail before a viable option is adopted, and consistent with the pre-diffusion literature (Ortt, 2010), frequently no viable model can be established. However, the rise of Google and Facebook demonstrates that abnormal returns can also be realised through business model innovation (Lindgardt et al., 2009). McGrath (2010) notes that BM disruption particularly takes place following disruptive innovation (Bower & Christensen, 1995; Christensen, 1997).

A consensus has developed that BM innovation is critical to company performance (Chesbrough, 2007; Ireland, Hitt, Camp, & Sexton, 2001; Johnson, Christensen, & Kagermann, 2008). Considering the cognitive dimension, the BM concept is similar to the influence of a dominant logic (Prahalad & Bettis, 1986; Prahalad, 2004a). Chesbrough (2010) suggests that BM innovation has two main barriers to overcome in incumbents. Firstly, structural barriers such as conflicts with existing processes, assets and BMs, much like core strengths and rigidities (Leonard-Barton, 1992), with the need for the reconfiguration of processes and assets. Secondly, cognitive barriers can cause managers used to a certain set of BMs to fail to recognise the value potential of new BMs, slowing or halting BM innovation.

In the dynamic field of BM research, Giesen, Berman, Bell, and Blitz (2007) have suggested that incumbents engaged in BM innovation are concerned with: (1) industry model innovation involving changes to the industry value chain through moving into new industries, redefining existing industries and/or creating completely new sectors; (2) revenue model innovation, such as significantly changing the service-product value mix or new pricing models; and (3) enterprise model innovation, altering the role the organisation plays in the value chain, e.g. changing aspects of the extended enterprise and networks.

Amit and Zott (2012) have proposed that managers have three ways through which they can progress BM innovation: by (1) adding new activities, (2) linking activities in novel ways, or (3) changing which actors carry out an activity. As seen through this literature review, the BM is a systemic and complex construct, rich in potential (Massa & Tucci, 2014).

Changes in business models, such as the onset of OA publishing (Morgan et al., 2012; Nicholas et al., 2005), added to the pervasive application of technology to increase the reach, efficiency and scope of publishing and the dissemination of research have had a profound impact on scholarly publishing (Byrnes et al., 2014; Ware & Mabe, 2015), and influence the context of the research project.

2.20 Peripheral vision, vigilance and weak signals

Day and Schoemaker (2006) identified that most organisations lack the capability for peripheral vision through a study of 300 global senior executives, with over 80% of them admitting a shortfall in this area, exposing their organisations to a “vigilance gap”. They also recognised that the peripheral vision capability and routines of an organisation must be designed for the firm’s strategy, industry dynamics and overall volatility of its environment (Day & Schoemaker, 2006).

A study of corporate strategists revealed that their organisations had been surprised by as many as three high-impact competitive events in the past five years (Fuld, 2003). In addition, 97% of respondents said that their firms lacked any early warning systems to prevent similar surprises in the future. Companies regularly run through red lights, and with hindsight, managers wonder how the signals could have been missed (Wissema, 2002). Widely known examples abound in both the corporate and public sectors, including the 9/11 terrorist attacks, Hurricane Katrina (Bazerman & Watkins, 2008) or corporate scandals seen too late (Strauss & Schäfer, 2014). Risk management researchers categorise potential disruptions on two dimensions: the likelihood of occurrence and the magnitude of impact, with recent research also emphasising the importance of early detection to increase organisational resilience (Sheffi, 2015).

The development of the concept of peripheral vision in business was driven forwards through a conference in May 2003 at Wharton that generated a special issue in *Long Range Planning* in 2004 devoted to the theme. The contributions considered the organisational periphery, and how to manage it more effectively, (Day & Schoemaker, 2004b). Prahalad developed his insights in the area of organisational dominant logic: “The dominant logic of the company is, in essence, the DNA of the

organisation. It reflects how managers are socialised. It manifests itself often, in an implicit theory of competition and value creation. It is embedded in standard operating procedures, shaping not only how the members of the organisation act but also how they think. Because it is the source of the company's past success, it becomes the lens through which managers see all emerging opportunities. This makes it hard for incumbent companies to embrace a broader logic for competition and value creation" (Prahalad, 2004a, p. 172).

The periphery is identified as the by-product of what the organisation sees as important. However, challenger companies: 'Have no legacy systems and nothing to forget', blindsiding incumbents (Day & Schoemaker, 2004b, p. 119). Presciently, considering the recent rapid growth of companies such as Facebook, Google, eBay, Amazon and Twitter, Xerox's Seely Brown identified that diffused expertise at the periphery would become increasingly important as a source of innovation signals (Seely Brown, 2004). Thoughtful practitioners recognised the importance of both immersion in the periphery, and 'targeted hunting' (Huston, 2004), as processes that supported the generation of breakthrough opportunities. Crucial to this study, the Wharton conference and subsequent special issue identified that it was important for organisations to: "Make use of electronic or artificial aids (using technology to augment, amplify and organize information from the environment to challenge existing perspectives)" (Day & Schoemaker, 2004b, p. 120) to make sense of the periphery.

Day and Schoemaker developed their thinking further through the publication of *Peripheral Vision* (Day & Schoemaker, 2006, p.4), where they proposed seven steps to bridging what they saw as the "vigilance gap":

1. Scoping: where to look
2. Scanning: how to look
3. Interpreting: what the data means
4. Probing: what to explore more closely
5. Acting: what to do with these insights
6. Organising: how to develop vigilance
7. Leading: an agenda for action

The study explores how incumbents manage this process.

The importance of search and select to the overall innovation process has already been established. Searching for innovation signals is complex, requiring organisations to look both at their focal activities, and those at the periphery where disruptive innovation threats and opportunities are frequently developing. The rapid development of digitally enabled product usage in HE and other industries e.g. scholarly journals (Rowlands et al., 2008; Tenopir, Volentine, & King, 2013), communication tools e.g. Researchgate (Thelwall & Kousha, 2014, 2015) and data capture e.g. Amazon (Chen & Storey, 2012; McAfee & Brynjolfsson, 2012) means that to survive and grow, incumbents have to develop their capabilities to search core (focal), adjacent and peripheral (transformative) arenas, so that they can size and respond to both short and long term developments affecting their future relevancy and growth.

The peripheral vision metaphor developed by Day and Schoemaker (2006) helps to highlight the complex process and dynamics supporting an organisation's capacity to see what lies ahead. In human and animal vision, the periphery is the: "Fuzzy zone" outside the area of primary focus (Day & Schoemaker, 2006, p. 19). For humans, focal vision helps us to concentrate on core tasks, and to be efficient in completing them. Humans still rely on peripheral vision, e.g. when driving or looking after children, to avoid danger (Day & Schoemaker, 2004b).

Influenced by Senge (2006), Eisenhardt (1998), Burt (2004), and Surowiecki, (2004) amongst others, Day and Schoemaker (2006, p.140) identified five components of peripheral vision capability critical to organisations seeking to sense the periphery:

1. Vigilant leadership that encourages a broad focus on the periphery
2. An inquisitive approach to strategy development
3. A flexible and inquisitive culture
4. Knowledge systems for detecting and sharing weak signals
5. An organisational structure and processes that encourage the exploration of the periphery

Organisations, just like individuals, find it difficult to see and comprehend the periphery, making it difficult to respond to or ignore emerging threats and opportunities. Peripheral vision requires alternative strategies and capabilities to searching the focal (core) area of the firm's activities: "In areas such as scoping, scanning, interpreting, probing and acting. It entails much more than merely receiving a signal at the edge of vision. It is knowing where to look, how to look, what the signals mean, when to turn one's head to look in a new direction, and how to act on these ambiguous signals" (Day & Schoemaker, 2006, p. 20).

Since the publication of *Peripheral Vision*, the business environment has changed considerably. A particular aspect of human and organisational change has been the increase in digital connectedness. Schmidt (Executive Chairman of Google) and Cohen (Director, Google Ideas) wrote in 2013 "Soon everyone on earth will be connected. With five billion more people set to join the virtual world, the boom in digital connectivity will bring gains in productivity, health, education, quality of life and myriad other avenues in the physical world" (Schmidt & Cohen, 2013, p.13). They also note "The internet is the largest experiment involving anarchy in history. Hundreds of millions of people are, each minute, creating and consuming an untold amount of digital content in an online world that is not truly bound by terrestrial law" (Schmidt & Cohen, 2013, p.3).

With seven billion mobile cellular subscriptions corresponding to a penetration rate of 97% and an increase in global Internet penetration from 6.5% to 43% between 2000 and 2015 (Sanou, 2015), digital activity has increased markedly. This increase in digital connectedness, and the attendant changes in social behaviour (Cachia, Compañó, & Da Costa, 2007; Nicholas, Rowlands, Clark, & Williams, 2011), expand and change the periphery that organisations need to sense and respond to (Mayer-Schönberger & Cukier, 2013). The dramatic growth of digitally based communication, along with increasing consumption of digital services (Brynjolfsson & McAfee, 2011; Downes & Nunes, 2013), is a fundamental challenge to many businesses.

The processes and capabilities needed to develop peripheral vision are distinct from the capabilities that an organisation typically has in place for effective focal vision in core business markets. Developing these new capabilities increases costs, and creates the need for senior management attention and skills to process weak, peripheral signals. This: “Leads to a fundamental challenge for the organisation: What is the right balance between focal and peripheral vision” (Day & Schoemaker, 2006, p.22)?

Multiple perspectives help to provide greater peripheral vision, as no single technique will reveal the whole picture (Schoemaker & Day, 2009), particularly when dealing with weak signals. The risk of weak signals being ignored or distorted due to “groupthink”, as they do not fit in with what the organisation wants to hear, are significant (Janis, 1972; Sunstein & Hastie, 2015). In rapidly changing business landscapes, there is a need to explore options and ideas outside the mainstream (Schoemaker & Krupp, 2015), with teams needing to develop different modes of inquiry and the capacity to learn from setbacks (McGrath, 2011; Schoemaker, 2011). With greatly expanded connections with the world outside their firm, leaders can become overwhelmed with external information, and there is a need to integrate sources of data with knowledge systems and analytical support to prioritise signals and collective sensemaking (Schoemaker et al., 2013; Weick, 1995).

There is a gap in the innovation search and select literature concerning peripheral vision, and how organisations search the digital periphery for breakthrough opportunities in turbulent environments. Research has not kept up to date with how major changes associated with the digital era affect incumbents, and how NPD focused innovation search and select is structured and operationalised in peripheral environments regarding products and services that are principally consumed online.

2.21 Opportunity recognition and evaluation

Kirzner's research and writings concerning alertness to profit opportunities have had a major influence on the development of the academic field of entrepreneurship (Kirzner, 2009; Klein & Foss, 2010). Shane & Venkataraman (2000, p. 218) defined research into entrepreneurship as: "The scholarly examination of how, by whom, and with what effects opportunities to create future goods and services are discovered, evaluated and exploited." To achieve these goals: "The field involves the study of sources of opportunities; the processes of discovery, evaluation, and exploitation of opportunities; and the set of individuals who discover, evaluate, and exploit them"(Shane & Venkataram, 2000, p. 218). A particular characteristic of entrepreneurial opportunities is that they require the discovery of new means-ends relationships, whereas all other opportunities develop the efficiency of existing goods, raw materials, organizing methods and services (Kirzner, 1997; Shane & Venkataram, 2000).

Scholars have argued that entrepreneurship is principally concerned with newness, often related to new technologies, resulting in novel products, new markets and new processes (Daily, McDougall, Covin, & Dalton, 2002; Ireland, Hitt, & Sirmon, 2003; Lumpkin & Dess, 1996). Shane & Venkataram (2000) suggested that both discovering and exploiting opportunities is the basis of wealth creation through entrepreneurship (Ireland et al., 2003). To create additional wealth, companies and individuals with enhanced skills in sensing and seizing opportunities stand to benefit (Krupp & Schoemaker, 2014; Teece, 1998). Significantly, both viewpoints agree that opportunity recognition is at the centre of entrepreneurship (Eisenhardt & Brown, 1999; McCline, Bhat, & Baj, 2000).

The strategic management literature emphasises the importance of advantage seeking for wealth creation (Ireland et al., 2003), as is opportunity seeking (i.e. entrepreneurship). However opportunity seeking to develop competitive advantage in core, adjacent and breakthrough environments requires firms to develop both opportunity and advantage seeking capabilities at the same time (Amit & Zott, 2001; McGrath & MacMillan, 2000). Considering the research project, the requirement to develop both advantage (sustaining innovation) and opportunity (radical and

breakthrough) seeking capabilities informs both the development of a portfolio of opportunities (Day, 2007; Radjou & Prabhu, 2015), and the organisational structure to manage these different processes (Davis et al., 2009).

Start-ups and small companies have typically been relatively effective in identifying entrepreneurial opportunities, but are less skilled in creating and maintain the competitive advantages required to exploit opportunities over a prolonged period (Ireland et al., 2003). More established organisations are typically adept in developing and sustaining competitive advantage, but often lack the capability to identify opportunities suitable for exploitation through their capabilities and resources (Markides & Geroski, 2005). However, some incumbents are effective at introducing radical innovations into markets (Chandy & Tellis, 2000; Tellis, 2013), and so must – in certain circumstances – be effective at opportunity recognition. The challenge for incumbents is how best to identify opportunities effectively. Should they be looking themselves, or should they be working through smaller organisations better suited to developing opportunities, but who lack the scale and skills to commercialise radical opportunities (Markides & Geroski, 2004)?

While the literature suggests that opportunity recognition demands different structures to operationalise the search process beyond the core business, recent research suggests that firms do not necessarily need to separate the processes of opportunity discovery and opportunity realisation (Foss & Lyngsie, 2015). The decentralisation of opportunity discovery and realisation furthers performance, as long as it happens in the same corporate venture unit (Foss & Lyngsie, 2015; Hill & Birkinshaw, 2008).

A key question addressed in the entrepreneurship field concerns why entrepreneurs recognise opportunities that others fail to recognise (Baron, 2006, 2007)? Busenitz and Barney (1997, p.11) found that: “After a great deal of research it is now often concluded that most of the psychological differences between entrepreneurs and managers in large organisations are small or non-existent.” Research on cognition has indicated that entrepreneurs who recognise opportunities are strong at pattern recognition (Baron, 2006), but there is limited evidence to support this premise. Dyer, Gregersen, & Christensen (2009, 2011) suggest that innovative entrepreneurs differ

from executives who have never started an innovative venture on four behavioural patterns: (1) questioning, particularly challenging the status quo; (2) observing; (3) experimenting with a “hypothesis testing mindset”; and (4) idea networking, testing ideas across a diverse network.

Opportunity evaluation has suffered from a lack of attention as an area of research as compared to opportunity recognition (Wood & McKelvie, 2015). Research in this area has advanced since Shane & Venkataraman (2000) helped the academic entrepreneurship community to conceptualise the opportunity recognition task, which logically needs to be paired with an effective opportunity evaluation process. Recent research has served to increase the overall understanding of opportunity evaluation looking at the characteristics of both individuals and organisations. Amongst others, factors such as emotions (Grichnik, Smeja, & Welp, 2010), uncertainty (McKelvie, Haynie, & Gustavsson, 2011), differences in schematic richness, schematic association, and schematic priming (Valliere, 2013), values (Shepherd, Patzelt, & Baron, 2013), and prior knowledge (Haynie, Shepherd, & McMullen, 2009) all influence opportunity evaluation.

As opportunity evaluation research develops, there is a need to establish how different factors, such as values (Shepherd et al., 2013) and worst-case scenarios (Wood & Williams, 2014) combine to influence evaluation and decision making (Drover, Wood, & Payne, 2014). The role of heuristics and rule-based reasoning in opportunity evaluation presents an opportunity to develop a theoretical framework to advance understanding in this key stage of the innovation and entrepreneurial processes (Sull & Eisenhardt, 2012; Williams & Wood, 2015).

2.22 Market research in the digital era

Innovation is a process that involves moving ideas forward, improving and fine-tuning them over time, threading a mix of: “Knowledge spaghetti” (Tidd & Bessant, 2013, p.301) together to deliver value to stakeholders through a product, process or increasingly a service. Triggering the innovation process is not just concerned with “eureka” moments, but involves seeking out promising opportunities, “headaches”, and “jobs-to-be-done” (Christensen et al., 2007; Johnson et al., 2008). A wide range of stimuli exist, from knowledge push, when scientific breakthroughs and new technology create “new to the world” opportunities, to needs pull, with innovators using techniques such as ethnography (Arnould & Wallendorf, 1994) or collaboration with lead-users (von Hippel, 1986), to identify and figure out solutions to unmet needs, or better ways (cheaper, faster, easier) ways to deliver solutions (Tidd & Bessant, 2013).

Examples abound of occasional breakthroughs followed by longer periods of exploring and elaborating better ways to develop the original idea, and this pattern has been researched extensively (Dosi, 1982; Tushman & Anderson, 1986). Developing knowledge creates an “opportunity field”, but opportunities are distinct from the actual delivery of value to stakeholders in a sustainable way. A study found that 34% of new product developments do not fully reach their business objectives (Balachandra & Friar, 1997), whilst another study found the figure to be 90 per cent (Cooper & Kleinschmidt, 1993). The major cause of failure for new products and services is that they cannot be differentiated. To understand root causes, Japanese quality philosophy demands that product developers ask “why” multiple times (Ohno, 1988). Research by Cooper has shown that 98 percent of products that managers perceived to be “superior and differentiated” succeeded, whereas only 18 percent of “me-too” products survived (Cooper, 1998).

Companies tend to not use innovative approaches to market research because they do not have the resources, their organisations are not familiar with the new techniques, or they perceive data to be difficult to collect and analyse. Such perceptions act as a strong barrier to the adoption of new approaches (Goffin, Lemke, & Koners, 2010), and potentially choke innovation activity and potential.

Organisations have always used information to make decisions, but there is currently a radical change taking place, namely the rise of “big data”. Firms are moving from a constant shortage of data, to potentially having too much information. Mayer-Schönberger & Cukier (2013) argue that organisations can at last harness greater quantities of information, drilling down into details that could never be seen before.

Traditional market research mainly uses surveys and focus groups. Typically, the questions asked are based on knowledge of existing products, markets and customers. Companies strive to identify representative groups of customers or users. Insight is also sought into the dynamics of the decision-making unit (DMU) in B2B markets (Brennan, Canning, & McDowell, 2014; Ellis, 2011), and for influences on the purchase of expensive consumer items such as cars and white goods. Surveys are becoming increasingly difficult to administer, be they web or paper based, as response rates are frequently very low (Goffin et al., 2010).

Focus groups are widely used, with a mix of interview techniques and observation using two-way mirrors and video recording. The majority of market research managers report that the ideas generated by focus groups are unexciting and the new products based on them involve incremental innovations: “Customers often describe the solutions they want in endless focus groups and surveys.... How sad it is, then, that when the product or service is finally introduced – and the only reaction in the marketplace is a resounding ker-plop” (Ulwick, 2002).

Surveys and focus groups are valid market research techniques, provided that they are combined with a wider set of techniques enabling deeper insights and cross-validation of results. This is the philosophy behind hidden needs analysis, which uses a combination of techniques (Goffin et al., 2010). The importance of new approaches to understanding users and customers is equally important to the service sector (Magnusson, Matthing, & Kristensson, 2003). Research shows that: “Traditional market research and development approaches have proved to be particularly ill-suited to breakthrough products” s (Deszca, Munro, & Noori, 1999, p. 613). Customer needs identified through market research will include:

1. Known needs: Common knowledge and addressed in the features of existing products and services
2. Unmet needs: Needs that are known and articulated by customers, but are not currently addressed by current products and services
3. Hidden (or latent) needs: Needs that have not previously been identified either by market research or the customers themselves

Social science methods were initially used to understand the user-product interface, but they are now increasingly used to not only understand how products are used, but also to identify user's hidden needs (Goffin et al., 2010). Specialists from Cap Gemini reflected on the innovation process, and the key role of the reconnaissance phase, and wrote that "the scouting out of new opportunities and technological possibilities arguably creates the most value. Unfortunately, it is the least understood by managers" (Meyer & Ruggles, 2002).

Surprisingly little research has been done evaluating the growing number of techniques used in the search phase of the innovation process, particularly the "ideation" phase, where ideas come into the innovation funnel before they are evaluated and killed off, or kept in development (Cooper & Edgett, 2008). According to a 2005 Arthur D. Little global study, of five best practices identified, idea management has the strongest impact on the increase in sales by new products. The findings of the study showed that effective idea management results in an extra 7.2% of sales from new products (*Innovation Excellence 2005: How companies use innovation to improve profitability and growth*, 2005). Heising (2012) proposes the alignment of ideation portfolio management and project portfolio management to increase the effectiveness of the overall innovation process.

The real value of a market offering can only be assessed through the lens of the customer or user (Witell, Kristensson, Gustafsson, & Löfgren, 2011). The innovation search process should not focus on the market offering *per se*, but on the customer's value creation processes, through which value for customers emerges (Grönroos, 2007; Moeller, Ciuchita, Mahr, Odekerken-Schroder, & Fassnacht, 2013). The market research literature remains centred on decision making, focusing on what customers buy rather than what they actually do (Xie, Bagozzi, & Troye, 2008).

Cooper (2011) found that 96% of the poorest 20% of product innovation performers do a poor job of assessing the value of the product to the customer, with 93% doing market research poorly, if at all. These figures remain weak for average product innovation firms, with 83.5% doing a poor job of assessing the value of the product to the customer, with 82% doing market research poorly, if at all. The author adopts the view of Cooper (2008), Johnson (2008), Goffin (2010), Grönroos(2011), and Witell (2011) that the search for innovation triggers should focus on the real value that customers seek, and that the search process benefits from looking at the jobs-to-be-done by customers, users and non-customers (Ulwick & Bettencourt, 2008; Ulwick, 2002).

There is little empirical research comparing the effectiveness of online and offline qualitative research techniques, and experts see the results from online focus groups as being rather superficial (Brüggen & Willems, 2009). Cooper and Edgett's study (2008) surveyed 160 U.S. companies, looking at the various ideation methods and their perceived effectiveness. Interestingly, open innovation methods performed weakly. The results show that ethnography is perceived to be the most useful method, providing the greatest insight into user's unmet and unarticulated needs, but it is only used by about 13 per cent of organisations. Ethnography offers the opportunity to understand at a deep level what is important to the user "doing the job" (Christensen et al., 2007; Ulwick, 2002). Lead user techniques and focus groups are both widely used and regarded, while other methods such as disruptive technologies and peripheral vision are relatively often used, but their impact is not rated as highly. Limitations do exist with the study, as the impact of the methods is only measured by the manager's perceptions, and not through more systematic comparisons. In addition, how different methods were used in combination was not analysed.

With considerable focus on emerging big data research techniques, a conflict might be expected between ethnography and big data approaches to identifying innovation triggers (Cayla, Beers, & Arnould, 2014), particularly as practitioners appear slower to take up ethnography than academic social scientists (Cooper & Edgett, 2008), but Cayla et al. (2014) argue that organisations will need to combine both big data and ethnography, and highlight researchers at IBM developing "ethno-mining". This

involves ethnographic storytelling based on the huge amounts of sensor and behavioural tracking data now being generated.

The latest change in ethnographic research is that consumers and companies are increasingly interacting digitally, through user groups. Researchers are adapting the conventional techniques of ethnography for use on the in the online digital environment, with netnography first emerging early in the millennium (Kozinets, 2002) and the approach developing terms to describe the observed communities such as “Crowds, Hives, Mobs and Swarms” (Kozinets, Hemetsberger, & Schau, 2008, p. 339). While a great deal of business activity in the digital social media era is focused on marketing promotion, webnography can provide access to leading and extreme users of digital services (Puri, 2009). A model for “Community Based Innovation” has been developed integrating input from online communities and more traditional lead user techniques (Füller, Bartl, Ernst, & Mühlbacher, 2006). Use of ethnography on the web, also known as web ethnography, is most appropriate when the relationship between a company and its’ users is concerned with digital services, rather than communication about a physical product or service (Prior & Miller, 2012).

Due to rapid changes in how customers and users engage with the HE publishing products (Nicholas et al., 2011; Rowlands et al., 2008; Tenopir, King, Christian, & Volentine, 2015), some initial research has been undertaken into how social media is used within the rapidly evolving research workflow (Rowlands, Nicholas, Russell, Canty, & Watkinson, 2011). In STM research communities, research workflows are an area of both development and research (Sonntag & Karastoyanova, 2013; Taylor, Deelman, Gannon, & Shields, 2014). A question emerging from the literature review is whether HE publishers have the capabilities in place to undertake market research using digital era research techniques such as data analytics and netnography in current fast evolving HE research environment.

2.23 Operationalising search and select to balance exploitation with exploration

Operational efficiency is a: “Necessary, but insufficient, condition for sustained competitive advantage” (Krause, Semadeni, & Cannella Jr, 2013, p. 10). Kortmann et al. (2014) demonstrate that ambidextrous operational capabilities link strategic flexibility and operational efficiency. To understand the complex relationship between operational efficiency and strategic flexibility, it is useful to build on the dynamic resource-based view of the firm (Helfat & Peteraf, 2003; Helfat et al., 2007; Teece, 2007; Winter, 2003) to emphasise the role of operational capabilities and their influence on dynamic capabilities and firm performance (Helfat & Peteraf, 2003).

Transient advantage environments see relatively short exploitation periods, with fewer business contexts presenting the boundary conditions of industrial organisationtheory. In this changed business environment, the application of strategic management models built for stable conditions to firms operating in transient advantage markets appears inappropriate. RBV scholars have introduced dynamism into their models, looking at “operational” and “dynamic” capabilities, and considering life-cycle perspectives (Helfat & Peteraf, 2003; Helfat & Raubitschek, 2000; Helfat & Winter, 2011).

Organisations have to operationalise search and select behaviours, otherwise they risk being taken over and diminished by atrophy (Hamel & Prahalad, 1994). The literature is well established on the “routines” (structures, processes, behaviours)” for exploitation where adaptation and incremental improvement are the order of the day (Henderson & Clark, 1990; Turner et al., 2012). However, routines can become rigid, limiting how and where firms search, and how they respond to stimuli (Gilbert, 2005).

To compete and win in transient advantage arenas, one of the most critical capabilities that an organisationhas to develop and exploit is how to identify and respond to existing, emerging and hidden needs. This places major demands on the market research capabilities of organisations (Goffin et al., 2010), grappling with a predominantly service economy (Vargo & Lusch, 2004), digitization (Brynjolfsson & McAfee, 2011), and unprecedented opportunities to understand end-user needs

through big data (Westerman, Tannou, Bonnet, Ferraris, & McAfee, 2012; Rose, Barton, Souza, & Platt, 2013).

Due to the inherent risks associated with innovation search, companies diversify their search plans and portfolio (Leiponen & Helfat, 2011). A broad search strategy: “Adds new elements to the set, improving the chances for finding a useful combination (Katila & Ahuja, 2002). The breadth of knowledge sources is associated with positive NPD outcomes (Klingebiel & Rammer, 2014; Leiponen & Helfat, 2011). While an early study of the use of scientific knowledge in innovation found that a third of critical knowledge came from outside the firm, companies such as P&G have targets to acquire 50 per cent of the ideas for new products from beyond the boundaries of the firm (Huston & Sakkab, 2006; Lafley & Martin, 2013).

Studies have confirmed that broad external networks support the performance and growth of the firm (Owen-Smith & Powell, 2004; Powell et al., 1996), and the wider the range of external sources that organisations interact with, the more positive the innovation outcomes (Katila & Ahuja, 2002; Laursen & Salter, 2006; Leiponen & Helfat, 2010). However, the management of external partners is not straightforward, as the search channels that deliver different aspects of knowledge demand different types of connection, managed and interpreted by different people with a range of skills and objectives (Laursen & Salter, 2006). Developing broad external search across multiple sources and partners is resource demanding.

The literature also suggests that there can be disadvantages when companies increase the number of innovation projects, including a reduction in managerial attention to projects along with reduced strategic focus, increased levels of complexity and weakened incentives (Boudreau et al., 2011; Klingebiel & Rammer, 2014; Sull, 2003). Urhahn and Spieth (2014) have shown that effective governance of an innovation portfolio explains higher innovation outcomes. The positive impact of innovation project portfolio management on innovation outcomes has also been demonstrated (Killen, Hunt, & Kleinschmidt, 2007; Killen & Hunt, 2013; Spieth & Lerch, 2014).

Holmqvist (2009) reviews how either exploitation or exploration tends to expel the other, making it difficult to succeed at both, even though the challenge is to accommodate both types of activity (Benner & Tushman, 2003). A coherent understanding of the capabilities needed to enable the ambidexterity needed to operationalise search and select in the core, and beyond the core, is needed (Turner et al., 2012). O'Reilly et al. (2011, p. 8) summarise the challenges facing firms in organizing conflicting sets of activities: "What is missing is a clear articulation of those specific managerial actions that facilitate the simultaneous pursuit of exploitation and exploration...what is needed is greater insight into the specific micro-mechanisms required for a manager to implement and operate an ambidextrous strategy."

In considering how to develop innovation processes to deliver transient advantage in waves, organisations need to operationalise the search routines to identify and trigger shortened innovation cycles. This thesis aims to reveal the extent to which incumbents in the disrupting publishing industry have operationalised structured search and select processes across core, adjacent and breakthrough opportunities.

A key challenge for companies striving to explore and exploit simultaneously remains how to integrate exploitation and exploration search routines in the same organisation. Tushman and O'Reilly (1997) identified the need for "ambidextrous" capabilities to support innovation search and the subsequent selection, implementation and capture phases. The research project looks for the presence of the capability of the case companies to operationalise the search and select processes across exploit and explore environments considering core, adjacent and breakthrough opportunities.

2.24 Forecasting and scenario planning

Corporate foresight is expected to support the renewal of a portfolio of strategic resources (Rohrbeck & Gemünden, 2011), with strategic resources being the basis of the competitive advantage of the firm (Collis & Montgomery, 1995). Innovation is central to the renewal of the firm, with different capacities required to innovate incrementally and radically (March, 1991). The RBV has shown that a firm's resources should be difficult to imitate, be scarce, and yield competitive advantage (Amit & Schoemaker, 1993; Dierickx & Cool, 1989).

Dynamic capabilities lose their power to sustain competitive advantage over time (Ambrosini & Bowman, 2009; Dutta, Narasimhan, & Rajiv, 2005; Helfat & Peteraf, 2003). To regain competitive advantage, or build new advantage in new environments, firms need to develop new resources (Eisenhardt & Martin, 2000; Teece et al., 1997). The renewal of resources has been shown to take place inconsistently, spanning periods of slow, incremental change, and intense periods of radical change (Brown & Eisenhardt, 1997; Gersick, 1991). When companies cannot change and develop new resources, their existence is challenged (Foster, 2012; Stubbart & Knight, 2006).

However many firms fail to detect discontinuous change due to ignorance (Rohrbeck & Gemünden, 2011), which can be due to an adherence to organisational planning cycles (Ansoff, 1980), and signals remaining undetected as they are outside the reach of the firm's sensors (Day & Schoemaker, 2004b; Pina e Cunha & Chia, 2007; Rohrbeck & Gemünden, 2011; Winter, 2004). Senior management can suffer from too much information, or lack the capacity to make sense of the signals (Eppler & Platts, 2009; Kernbach, Eppler, & Bresciani, 2015), or middle management can filter information to protect business unit interests (Lucas & Goh, 2009).

To avoid being blindsided, organisations can decide to design and implement a strategic radar system to pick up signals and make sense of them (Schoemaker et al., 2013). Scenario planning can be useful in seeking information, and making sense of it (Bradfield, Wright, Burt, Cairns, & van der Heijden, 2005). A few scenarios usually help to establish a broad range of exogenous futures which might

develop. What is important is that a broad range of alternatives is considered (Wack, 1985). Scenarios do not represent states of the future, but illustrate what might happen (Varum & Melo, 2010). The objective in developing scenarios is to bound the uncertainty range of the future, helping to provide frameworks for managerial discussions, both widening thinking, and helping to create focus when it comes to resource allocation (Burt & van der Heijden, 2008; Schoemaker et al., 2013; Schoemaker, 1993).

Schoemaker et al. (2013) suggest that an organisation's strategic radar system is made up of three major activities:

1. Monitoring external signals to deliver regular updates about pre-specified trends and forces shaping the targeted business environments
2. Assessment of strategic actions informed by the monitoring of external signals
3. Scanning for additional weak signals that might shape the external environment. This step is different from (1) above, as it involves looking for unexpected signals

Shell has long been a leader in scenario planning, which it has used to explore options and drive forward innovation in a structured manner (De Geus, 1996), and now uses the GameChanger programme to support scenario planning (Hansen & Birkinshaw, 2007). "Transitional objects" are used in much the same way as prototypes, concept models and beta versions of software are used in product development, to generate reactions and shape a focus for strategy development and the allocation of innovation resources (Chermack, 2011).

Projected demographic trends for the next 50 years will dramatically change markets. The aging population in Western economies will create particular needs including healthcare funding and needs for a range of low-cost products and services (Ghemawat, 2011b). Asia will see growing demand for education (OECD Publishing, 2013), with opportunities growing across the whole spectrum of the population (Gouillart & Ramaswamy, 2010; Prahalad, 2004b; Radjou & Prabhu, 2015). Companies that can accurately identify the needs of users and customers in developing markets will be at an advantage (Govindarajan & Trimble, 2012).

Appropriate products and services may be low-tech and have fewer features than their Western equivalents.

Forecasting work and scenario planning considers regulation, which can both accelerate and dampen innovation, in different situations. Certain innovation pathways might be closed off, while other new ones may be mandated for exploration (Blind, 2007). Recent research considering the impact of EU regulation on innovation suggests that regulation is progressively slowing down the development of innovation (Amable, Demmou, & Ledezma, 2009). However, regulation also drives change in behaviour, particularly in the area of safety (Dodgson et al., 2007).

Even with the rise in risk management procedures, including business analytics and the massive rise in big data (Brynjolfsson et al., 2011; Davenport, Harris, & Morison, 2010), businesses continue to be caught unawares, or are just unprepared for changes in their business environments. A recent survey highlighted the special challenges for decision-making arising from big data, with 85% of respondents indicating that the issue was not so much volume as the need to analyse and act on big data in real-time. Familiar challenges relating to data quality, governance and consistency also remain relevant, with 56% of respondents citing organisational silos as their biggest problem in making better use of big data. The respondents consider that: "Data is now the fourth factor of production, as essential as land, labour and capital" (*The Deciding Factor: Big Data & Decision Making*, 2012, p. 2).

Publishing as an industry is good at knowledge management. This is unsurprising, as publishers have played a key part in the flow of knowledge since the invention of printing ("From Papyrus to Pixels," 2014; Silver, 2012; Ware & Mabe, 2015). However, while incumbents are good at looking at their focal business using known techniques (Tellis, 2013), they typically have greater difficulties understanding environments beyond the core.

Due to the importance of searching for signals to inform the longer term strategy of the firm, the research project look for the presence of the capability in the case companies to both seek out and share contextual domain insights regarding the macro social and technology trends impacting on core and beyond the core environments.

2.25 User driven innovation

With the importance of end-users as important actors in external innovation well established (von Hippel, Thomke, & Sonnack, 1999; von Hippel, 1986, 2005), it is widely accepted that user inspired innovations can enrich the innovation ecosystem, and offer vital feedback and ideas for the organisation (Franke, 2014). A study of the medical device industry revealed that innovations integrating user knowledge diffuse more broadly, with greater impact, than those that do not (Chatterji & Fabrizio, 2012).

Users are often ahead of suppliers, with their ideas and frustrations leading to experimentation and prototypes of what can become mainstream innovations. von Hippel has pioneered the study of the opportunities presented by users as innovators (Mangelsdorf & von Hippel, 2011; von Hippel, 1986, 1988, 2005), enabling both firms and individuals to innovate with both information based products, e.g. computer apps, and physical products, e.g. running shoes or toys. Crowdsourcing enables innovators to seek insights from both B2C and B2B users, creating insights which risk being buried in massive amounts of data (Afuah & Tucci, 2012).

Extreme users are another important place to look for innovation triggers, linking the idea of the lead user and needs on the margins of existing markets. Looking for extreme environments or users stretches innovators, as they encounter challenges which provide new opportunity spaces. The thinking is that if firms can please the most demanding users in the toughest environments, then opportunities should follow (Gardiner & Rothwell, 1985). The “bottom of the pyramid” environment generates extreme opportunities that companies may, or may not have the capabilities to meet (Karamchandani, Kubzansky, & Lalwani, 2011). Jugaad innovation (Radjou et al., 2012) has emerged as an approach to innovating with extreme users based on the Hindi word “Jugaad”, which is translated as “an

innovative fix, an improvised solution born from cleverness and ingenuity” (Radjou et al., 2012, p. 4). This approach can create solutions and indications of possibilities beyond extreme environments, setting up reverse (Govindarajan & Trimble, 2012) and frugal “do more with less” (Radjou & Prabhu, 2015) innovation opportunities through deep user understanding.

Users will often reveal their innovations openly, and this has been observed in sectors such as library information systems (Morrison, Roberts, & Midgley, 2004) and sporting equipment (Franke & Shah, 2003). When innovations are fully revealed, it can become a public good (Harhoff, Henkel, & von Hippel, 2003). The user innovators may give the innovation away to increase diffusion (Raymond, 1999), or due to a community having a “norm of sharing” (Franke & Shah, 2003), or to enable a third party to produce the innovation at a cheaper cost than the innovator could (Harhoff et al., 2003). The pattern of freely revealing developments to the benefit of other users has been summarised as the “private-collective innovation model” (von Hippel & von Krogh, 2003), which is an approach consistent with the OSS and open science movements.

Three main methods have been identified for exploiting user innovativeness: (1) lead user methods; (2) toolkits for user design; (3) crowdsourcing. The approaches are not mutually exclusive (Franke, 2014). The field of user driven innovation is dynamic, and the summary below is not exhaustive.

The lead user method was developed as a managerial heuristic (Urban & von Hippel, 1988), helping organisations to search for user validated innovations, and encounter radically new business opportunities (Franke, 2014). Lüthje and Herstatt (2004) broke down the lead user research process into a number of phases, being the identification of major needs and trends, and the identification of lead users. A number of detailed studies demonstrated that the lead user method can systematically generate and validate ideas for commercially attractive new products (Lilien et al., 2002; Urban & von Hippel, 1988).

Lead user studies have identified that the pyramiding method supports the identification of lead users (Lilien et al., 2002). Experiments have shown that pyramiding search strategies are more efficient than screening users (von Hippel et al., 2009). Pyramiding also supports the identification of individuals outside a pre-defined population or sample (Poetz & Prüggl, 2010). Analogous markets are valuable sources in identifying lead users, and broaden the range of inputs into the innovation search process (Franke, Keinz, & Klausberger, 2013; Franke, 2014).

Toolkits represent another method to outsource product design to users and customers. von Hippel developed the idea of : “Toolkits for user innovation and design” as sets of design tools enabling users to design their own products including their own preferences, sharing their designs with a supplier (von Hippel & Katz, 2002; von Hippel, 1998, 2001b). An important feature of toolkits is that they give the supplier (or design orchestrator) feedback during the design process, while also enabling both the user and supplier to benefit from what von Hippel (1998) called “trial-and-error” learning. Franke and Piller (2004) found that customers were ready to pay twice as much for a self-designed watch than for a similar watch with the same level of objective quality, and this preparedness to pay higher prices has been confirmed in a number of studies across a range of product areas including kitchens, t-shirts, fountain pens (Franke, Schreier, & Kaiser, 2010; Franke & Schreier, 2010; Franke, 2014; Schreier, 2006).

A third means to access user creativity is to “crowdsource” the task, and this method is also referred to as “broadcast search” (Jeppesen & Lakhani, 2010) and “virtual co-creation” (Füller, 2010). Companies pose problems to or questions to “crowds” through online calls for solutions, with the sponsor then evaluating the solutions, selecting what they view as the best solutions (Dahlander & Magnusson, 2008; Ogawa & Piller, 2006). The strength of the crowdsourcing concept is that “crowds” are typically made up of a wide range of contributors with a wider range of perspectives on the problem, skill sets, and solution options than are available within a single company (Jeppesen & Lakhani, 2010; Surowiecki, 2004). Crowdsourcing is being used in a wide range of industries including consumer electronics, pharmaceuticals, and high-tech R&D problems (Bullinger, Neyer, Rass, & Moeslein, 2010; Franke, 2014; Nambisan & Baron, 2010; Ogawa & Piller, 2006). Studies have

demonstrated that crowdsourcing can outperform the internal professionals in identifying new product ideas in consumer markets such as baby products (Poetz & Schreier, 2012).

A strong theme running through the user driven innovation literature is how widespread distribution of the internet opens up the innovation search process to engage and learn from users both in identified and analogous segments. The research project is focused on the HE publishing market which is dominated by digital products that are deployed by users virtually, as they integrate digital products into their own workflows (Aalst, Hofstede, & Weske, 2003), creating the opportunity to explore the role of user driven innovation.

The concept of workflow grew out of business process management (BPM) (Georgakopoulos, Hornick, & Sheth, 1995), and can be defined as: “Supporting business processes using methods, techniques and software to design, enact, control and analyse operational processes involving humans, organisations, applications, documents and other sources of information” (Aalst, Hofstede, & Weske, 2003, p.4). The tools supporting the management of these operational processes became known as business process management systems (BPMS) (Ko, Lee, & Lee, 2009). The idea of developing solutions to increase user effectiveness connects with design thinking, which can be seen as the: “Human-centered approach to innovation that puts the observation and discovery of often highly nuanced, even tacit, human needs right at the forefront of the innovation process. It considers not just the technological system constraints but also the sociocultural system context” (Gruber, de Leon, George, & Thompson, 2015, p. 1).

Design management and design thinking (Brown, 2008; Bruce & Bessant, 2002; Hargadon & Sutton, 1997; Martin, 2007), are regularly used as tools for both product and service innovation, as organisations seek to understand the pervasive problems facing individuals in their work. The importance of understanding the problems of stakeholders across the business customer from the decision making unit (DMU) to the user is emphasised in the service marketing literature (Grönroos, 2011; Lusch, Vargo, & Tanniru, 2009). A key issue for firms is to understand the workflow of its users across core, adjacent and breakthrough environments. The workflows of users

are changing fast in the HE publishing environment, making the understanding of users jobs-to-be-done (Ulwick & Bettencourt, 2008; Ulwick, 2002) key for product development.

The research project will therefore look for the presence of the capability to seek out and share deep domain insights into user workflows to inform product development.

2.26 Identification and validation of pervasive problems, considering jobs-to-be-done

The market segmentation processes that companies adopt have major consequences, as they determine what the firm decides to produce, how it takes products to market, who it competes against and the size of its' commercial opportunities (Christensen et al., 2007). Most companies segment along criteria defined by product characteristics (price; performance; technology) or customers (age; income). In B2B sectors, size of customer, technology or industry might shape the categorization (Ellis, 2011). Recent research has shown significant benefits from segmenting markets and developing products considering the "job" that a customer finds that they need to get done, and they "hire" products or services to do the job (Bettencourt & Ulwick, 2008; Christensen et al., 2007; Ulwick, 2002). This means that innovators need to understand the jobs that customers encounter, for which products might be hired (Johnson et al., 2008). This is consistent with the service-dominant logic (SDL) perspective, which considers that a market offering is only attractive if it captures its value-in-use (Vargo & Lusch, 2004).

Aligned with service dominant logic, but largely developed through professional practice, the outcomes driven, or jobs-to-be-done approach to opportunity recognition and evaluation moves the innovation focus of the organisation from what is being produced – product or service – to enabling customers to get their jobs done effectively. The approach has gained recognition in the academic and practitioner literature (Bettencourt et al., 2014; Christensen et al., 2007; Christensen, Cook, & Hall, 2005; Christensen & Raynor, 2003; Ulwick & Bettencourt, 2008; Ulwick, 2002, 2005). In providing digital solutions to digitally experienced jobs-to-be-done, companies need to develop the capacity to capture data to validate what value is

required, and to measure if the solution has helped the user to achieve their desired outcomes (Belz & Baumbach, 2010; Kiron, Prentice, & Ferguson, 2014; Ulwick, 2005, p. 26-31; Westerman, Bonnet, & McAfee, 2014, p. 29-44).

Research by Booz & Company (now strategy&) showed that the largest investors in R&D typically underinvest in the “fuzzy front end” of innovation (Jaruzelski, Staack, & Goehle, 2014; Koen et al., 2001). The same study estimates that a mere 8% of large R&D spending is allocated to digital tools that track changing customer needs, in world which sees spending on R&D in the internet and software spheres increasing by 16.5% in 2014 vs. 2013. The outcomes driven innovation approach has been developed to enable companies to identify jobs-to-be-done, who is doing them, and what’s most important (Christensen et al., 2007, 2004; Ulwick & Bettencourt, 2008; Ulwick, 2002). The jobs-to-be-done literature includes a focus on service and value driven outcomes, connecting with the service dominant logic literature (Bettencourt, Brown, & Sirianni, 2013; Bettencourt et al., 2014).

The development of B2B solutions to support companies and managers in becoming more efficient and effective in operational terms has a long history (Womack et al., 1990), advanced by a marketing literature that has moved beyond goods dominant logic (Lindgreen, Hingley, Grant, & Morgan, 2012) to widespread acknowledgement of service dominant logic (Lusch, Vargo, & O’Brien, 2007; Michel, Brown, & Gallan, 2008; Moeller et al., 2013; Vargo & Lusch, 2004, 2011). The solutions that are being developed in the B2B space increasingly seek to solve the problems faced by individuals and work groups in their value creation processes (Grönroos, 2011). Within the management and marketing literature, as well as in the service literature, there is acceptance that value is created in the users’ processes as value-in-use (Grönroos & Ravald, 1996; Grönroos, 2008, 2011; Normann & Ramirez, 1993; Vargo & Lusch, 2004). In adopting a service lens, companies focus on value creation as helping customers to get one or more jobs done (i.e. achieving a goal or solving a problem) (Bettencourt et al., 2014).

Due to the speed with which user behaviours are changing, and new digitally enabled jobs are developing in the workflow of stakeholders, the project will evaluate

the presence of the capability to identify and validate “big enough” pervasive problems requiring solutions within the case companies.

2.27 Agile innovation and minimum viable products (MVPs)

Thomke (1998, p. 743) observed that: “Experimentation, a form of problem-solving, is a fundamental innovation activity and accounts for a significant part of total innovation cost and time”, and two decades of research into NPD and innovation has particularly focused on understanding how best companies can manage experiments to develop higher success rates at lower cost (Thomke & Reinertsen, 2012; Thomke, 1998, 2014). Early work with Toyota (Thomke & Fujimoto, 2000) emphasised the potential of rapid problem-solving to increase development performance.

The positive impact of user engagement in shortening NPD cycles while increasing success (Thomke & von Hippel, 2002; von Hippel et al., 1999) supports experimentation activities that enable fast failure, as the best teams aim to fail fast, often and cheaply (Blank, 2013; McGrath, 2011; Schoemaker & Krupp, 2015).

The notion that companies will flourish if they learn to be nimble and good at product development is not new (Denning, 2013), with the term “agile” being: “Coined by a group of researchers at Iacocca Institute at Lehigh University in 1991. The group involved many of the senior executives of US companies and the study culminated in a two-volume report conveying an industry-led vision for a fundamental shift in manufacturing paradigm” (Yusuf, Sarhadi, & Gunasekaran, 1999, p. 33). The most significant sector-wide adoption of internal agility has been in software development, and since the creation of the “Agile Manifesto” in 2001 (Beck et al., 2001). The aim of the Agile Manifesto was to place the goals and needs of the end-users of information and communications technology (ICT) at the centre of software development to deliver software that is both useful and usable. User-centred agile software development considers the process, practices, people/social and technology dimensions of delivering software (Brhel, Meth, Maedche, & Werder, 2015).

The agile process for developing software has been adopted widely and with significant effect in areas such as efficiency and stakeholder satisfaction (Serrador & Pinto, 2015), and positively influences project velocity and effort (Kupiainen, Mäntylä, & Itkonen, 2015). The agility concept has been applied to supply chains (Braunscheidel & Suresh, 2009; Brown & Bessant, 2003), and Sommer et al. (2015, p. 35) have identified that: “No less than nine different Agile methods have been described, including Scrum, Crystal, Extreme Programming, Adaptive Software Development, Agile Modeling, Dynamic Systems Development Method, Feature Driven Development, Internet Speed Development, and Pragmatic Programming.”

Despite the rapid adoption of agile software development processes, companies still struggle with the NPD process, with many companies treating the development process as being similar to manufacturing (Thomke & Reinertsen, 2012). Some organisations are starting to mix their NPD methods, combining elements of the agile method with traditional stage-gate processes (Sommer, Hedegaard, Dukovska-Popovska, & Steger-Jensen, 2015).

The publication of “The Lean Start Up” (Ries, 2011) increased the crossover between the agile movement and the practice of innovation, particularly in the US, and in entrepreneurial situations. Ries emphasised the critical importance of validated learning to product development, particularly in start-ups, as he encouraged technology entrepreneurs to move their products through a six stage loop made up of : (1) Ideas; (2) Build; (3) Code; (4) Measure; (5) Data; (6) Learn, minimising time and maximising learning constantly. The approach was influenced by the continual organisational learning approaches central to Toyota’s management system (Liker, 2004; Ohno, 1988), inspired in turn by Deming, and Christensen’s research into disruptive innovation (Christensen & Raynor, 2003; Christensen, 1997).

Ries promoted the critical role of a MVPs to entrepreneurs who need to start the learning process as quickly as possible, claiming that: “It is simply the fastest way to get through the Build-Measure-Learn feedback loop with the minimum amount of effort” (Ries, 2011, p. 93). The MVP term had been in use since at least 2000 as an element within a number of NPD approaches. The MVP approach is similar to

Blank's concept of the "minimum feature set" (Blank & Dorf, 2012). Ries was also influenced by Moore (1998), who advocated that early adopters accept, or even prefer, an 80 percent solution. Thomke (2014) emphasises that experimentation enables managers to drop the components of an offering that have a low or negative ROI. There are also parallels in the highly iterative MVP process with design thinking (Bruce & Bessant, 2002; Gruber et al., 2015; Martin, 2009).

The lean start-up approach favours: "Experimentation over elaborate planning, customer feedback over intuition, and iterative design over traditional "big design up front" development. Although the methodology is just a few years old, its concepts—such as MVPs and "pivoting"—have quickly taken root in the start-up world, and business schools have already begun adapting their curricula to teach them, with its emphasis on experimentation" (Blank, 2013, p. 66). Agile innovation approaches, typified by the application of MVP experimentation, have received extensive exposure through traditional means (Morris et al., 2014; Ries, 2011), and particularly through social media.

Academic research interest in the deployment of MVPs has been limited, despite the widespread use of agile approaches in IT technology dependent sectors (Brhel et al., 2015; Kupiainen et al., 2015; Serrador & Pinto, 2015). The absence of academic research into the deployment of MVPs within the select stage of the innovation process represents a gap in the literature.

The research project will look for the presence of the capability to validate and iterate opportunities using agile approaches, and MVP testing and learning techniques.

2.28 The role of knowledge in innovation management

With knowledge being so central to the innovation enterprise, this section of the literature review introduces the role of knowledge in innovation, and then considers the significance of the knowledge of individuals, absorptive capacity, networks and M&A to a firm developing innovation projects and capabilities.

2.28.1 Introduction

The role of knowledge in innovation has been recognised since the early days of innovation research (Rothwell, 1977). Innovation is about knowledge, and the creation of new products and services through the combination of different collections of knowledge. Collecting and mixing different knowledge sets typically occurs in uncertain environments. The management of innovation involves converting uncertainties into knowledge (Tidd & Bessant, 2013).

In the management field, the term knowledge can be confused with *data* (Leonard & Barton, 2014), which Davenport and Prusak (1998, p. 4) defined as: “Discrete, objective facts about events”, and *information*, which they defined as: “A message ... meant to change the way the receiver perceives something...data that makes a difference” (Davenport & Prusak, 1998, p. 4). *Knowledge* is information that is: “Relevant, actionable, and at least partially based on experience. It implies an understanding of processes, situations and interactions, and includes both skills and values. Knowledge may derive from science, history, structured education and vicarious as well as personal experience” (Leonard, 2011, p. xiv).

Henderson & Clark (1990) argued that innovation rarely deals with an isolated technology or market, but is better explained by the notion of bundles of knowledge integrated into a configuration. To manage innovation successfully, organisations must obtain and convert knowledge about components, and work through how they can be put together, creating the architecture of an innovation (Henderson & Clark, 1990). Incumbents often struggle when significant system level change occurs, because they have to both learn and structure a new knowledge system, while

“unlearning” a familiar and established approach to knowledge (Tidd & Bessant, 2013).

Two trends have particularly influenced the move of the locus of innovation from inside to outside the boundary of the company. Firstly, the complexity of knowledge needed for innovation, and the pace with which it needs to be implemented, are beyond the capabilities of even the most innovative organisations, and includes the development of basic science. (McGrath & Kim, 2014). Studies of innovation and creativity indicate that the most radical innovations are more likely when seemingly unconnected areas of knowledge are connected (Hargadon & Sutton, 1997; Burt, 2004; Fleming, 2001). The flexibility and speed needed for successful innovation is best provided by network structures connected to competitive markets. Increasingly, innovation strategies are developed and implemented with an inter-organisational focus.

The second trend driving the locus of innovation into the gaps between organisations are the network externalities of technology driven markets (Chakravorti, 2004; Garud, Kumaraswamy, & Karnøe, 2010; Katz & Shapiro, 1985). Classic examples of how third-party developers and complementors are a forceful joint driver of innovation include Bombardier and OSRAM (Haller, Bullinger, & Möslin, 2011).

Hargadon’s research (2003) on Thomas Edison has demonstrated how both networks and knowledge transfer supported the breakthroughs – both technical and architectural – of this most iconic of innovators, and many others. Brokerage theories of innovation acknowledge that the actions of individuals, and the management strategies that aim to support them are both enabled and limited when wider social structures are in place (Hargadon, 2014). High profile innovative organisations such as IDEO and Edison operate within and across multiple environments, which increases the knowledge sets that they can combine and re-combine. Similarly, while brainstorming may not be an efficient way of generating ideas, it has merit due to the variety and depth of experiences and knowledge that participants can contribute (Hargadon, 2014; Sutton & Hargadon, 1996).

Brokerage theories help to explain how some companies achieve a successful innovation stream by identifying and exploiting brokerage positions that cross a number of seemingly unconnected domains (Hargadon & Sutton, 1997; Hargadon, 1998). Individual and group cognition is both enabled and limited by exposure to multiple domains as compared to deep immersion in one context (DiMaggio, 1997; Hargadon & Douglas, 2001; Hargadon & Fanelli, 2002). Brokers integrate the work of others from diverse communities, through the input and knowledge of individuals and organisations (e.g. universities) that bridge wider communities developing social capital across the structural holes between groups develops options that would otherwise be unseen (Burt, 2004; Lingo & O'Mahony, 2010), which in turn shapes the impact of recombinant innovations developed through reusing resources from other organisations (Hargadon, 2003). Brokerage models of innovation draw extensively on cognitive psychology, actor network theory, social network theory and research into problem solving. Social network theory provides insights into the influence of weak ties (Granovetter, 1973) and structural holes (Burt, 2004) and underpins understanding of brokerage, as does Actor Network Theory (ANT) with individuals, ideas and artefacts represent nodes in larger networks (Law, 1992).

Searching for and integrating knowledge from external environments has long been a core strategic activity for innovating companies (Birkinshaw, Bessant, & Delbridge, 2007; Kogut & Zander, 1992; March, 1991). Recent years have seen the need for vigilance by leaders increasing (Day & Schoemaker, 2008; Schoemaker et al., 2013; Schoemaker & Krupp, 2015), along with the shift of the main locus of innovation from within the organisation to the network of actors making up the company's environment (Day & Moorman, 2010). Corporate practice at P&G (Huston & Sakkab, 2006; Lafley & Martin, 2013; *Procter & Gamble 2012 Annual Report*, 2013), academic theories such as co-creation (Hamel & Prahalad, 1994), open innovation (Chesbrough, 2003), and Adner's wide lens, ecosystem approach to innovation (2013) all reflect a shift in the locus of innovation to outside the organisation.

The product development funnel (Cooper, 2011; Dunphy, Herbig, & Howes, 1996; Sullivan, 2002; Tidd & Bessant, 2013) is concerned with capturing and managing knowledge through a logical, time bound process. With increased knowledge, uncertainty can be reduced to a measurable form of risk, as the more that is known

about an opportunity, the more that calculated decisions can be made about whether to proceed (Tidd & Bessant, 2013). Cooper's stage-gate process (Cooper, 1985, 2011) focuses on increasing knowledge about a project, reducing uncertainty, and making difficult trade-offs between the costs of continuing projects and the requirement for additional knowledge.

In organisations or divisions looking to achieve incremental (sustaining) innovation, the challenge is to search for process and product innovation within known or "knowable" environments (Bessant, Lamming, Noke, & Phillips, 2005a). Incremental product development ideas can come from external sources such as fashion trends (e.g. colour), suppliers, customer feedback, product reviews and sales analysis. Well established and proven market research techniques exist to enable companies to gain the knowledge needed to manage incremental product development reliably and cost effectively (Goffin et al., 2010). Internal sources of knowledge include staff engaged in continuous improvement programmes (Bessant, 2003).

Where innovations come from has changed over time. In a US focused study, researchers observed that while in the 1970s almost all the top 100 innovations of the year recognised by R&D Magazine came from corporations operating on their own, more recently over two-thirds of the winners were developed through partnerships including government, business, federal research and universities (Block & Keller, 2009).

Observing and learning from others is a highly effective way of bringing innovation into an organisation. The re-learning of Deming's teaching on lean manufacturing by western manufacturers through Ohno (1988) and "The Machine That Changed The World" (Womack et al., 1990), and the widespread copying of other company's ideas and strategies such as Southwest Airlines business model by other low cost airlines, stands testament to the power of imitation (Markides & Geroski, 2005; Schmenner, 2004). Benchmarking supports learning from others, but can lead to a "me too" focus on order qualifiers, rather than differentiation (Brown, Bessant, & Lamming, 2013).

"Design driven innovation" (Verganti, 2006) gives meaning, shape and form to products through the creation of features and design elements which users and

customers did not know that they wanted, relying on a wider knowledge set than is deployed with the jobs-to-be-done approach to search and select (Bettencourt et al., 2014; Christensen et al., 2007; Ulwick, 2002). The importance of design as a source of innovation is aligned with the increasing role of services of all shapes and types. The term “experience economy” (Pine & Gilmore, 1998) is used to reflect the changing nature of innovation from meeting functional needs to creating experiences (Voss, Roth, & Chase, 2008).

2.28.2 Individuals

Research indicates that scientists and engineers with access to different domains of knowledge are better able to transfer solutions originally developed for one domain to another (Fleming, 2001; Gruber et al., 2013; Hargadon & Sutton, 1997; Singh & Fleming, 2010), increasing the efficiency of search activities. People who span heterogeneous communities access unique information which develops a “vision advantage” (Burt, 2004). The vision advantage is recognised by colleagues (Dahlander et al., 2014), with external sources of knowledge more highly valued by other organisational members, due to the perception that this information is rarer than internal knowledge sources (Menon & Pfeffer, 2003). Individuals with the potential to increase search breadth increase access to a variety of knowledge sources that increases the total number of ideas on offer to solve innovation problems within the firm (Fleming & Sorenson, 2001; Reagans & Zuckerman, 2008; Rosenkopf & Nerkar, 2001; Winter & Nelson, 1982).

The benefits flowing from linking a range of knowledge resources in new ways are restricted when individuals only search within their own firm (Dearborn & Simon, 1958). Innovation search that does not reach beyond the boundary of the firm has a lower likelihood of impacting on technological developments (Rosenkopf & Nerkar, 2001). Research into the inventor’s search and discovery routines found that: “It is not always the depth of knowledge and experience of the searcher that results in discovery. Rather, it is the unique breadth of these components in addition to the ability to draw from seemingly different terrains and categories to arrive at solutions and discoveries” (Maggitti et al., 2013, p. 97). A study considering the innovation platform InnoCentive found that individuals distant from the knowledge domain

where the innovation problem arose were more able to develop solutions to the challenges than people closest to the original knowledge domain (Jeppesen & Lakhani, 2010).

A balance has to be found between the level of search breadth that people can sustain before the search benefits are reduced. Individuals have to achieve a balance between external search breadth and the wider innovation requirements of the company (Dahlander et al., 2014).

2.28.3 Absorptive capacity

Over the last twenty five years research has focused emphasised the significant role of absorptive capacity (AC) on a company's performance. Zahra and George (2002, p. 186) define AC as: "A firm's ability to acquire, assimilate, transform, and exploit new knowledge." Knowledge will only be useful when there is capacity to receive information both within the organisation, and across networks. Research has shown a positive linear relationship between AC and firm performance (Cohen & Levinthal, 1990; Leonard-Barton, 1995; Zahra & George, 2002). The argument made to support this positive direct relationship is that companies must continue to develop knowledge sets if they are to maintain competitiveness (Griffiths-Hemans & Grover, 2006).

Zahra and George (2002) suggested that the influence of AC could best be understood by considering complementary but separate potential and realised absorptive capacities. Potential capacity focuses on knowledge acquisition and assimilation capabilities, with realised capacity concerned with knowledge transformation and exploitation. While the innovation literature has focused more on potential AC, within AC there are processes and capabilities enabling knowledge search, acquisition, assimilation and exploitation (Tidd & Bessant, 2013; Zahra & George, 2002).

The AC field saw intense levels of research activity in the early 2000s, leading to a proliferation and inconsistency in the understanding of AC (Lane, Koka, & Pathak, 2006), with Lane et al., concluding that the term had become reified. “Reification is the outcome of the process by which we forget the authorship of ideas and theories, objectify them (turn them into things), and then forget that we have done so (Lane et al., 2006, p.835). Todorova and Durisin (2007) deepened understanding of the relationship between the identification and acquisition of knowledge, and the capacity to deploy that knowledge operationally. In identifying a more complex connection between the components of AC, with the transformation of knowledge being a separate process to the assimilation of knowledge (Todorova & Durisin, 2007), they emphasised the influence of socialisation mechanisms and power relationships within AC.

While the benefits of AC are broadly accepted, there are significant costs associated with developing AC at the firm level (Volberda, Foss, & Lyles, 2010). It can therefore be argued that there can be a point at which the costs of AC outweigh the benefits (Wales, Parida, & Patel, 2013). However, without absorptive capacity, organisations that want to innovate will have difficulties in accessing and aggregating external sources of knowledge. An added challenge for organisations establishing absorptive capacity is that the life cycle of an organisation is not predictable, and there will be variability in terms of the requirement to source and make sense of both internal and external knowledge, with periods of intense knowledge need (Phelps, Adams, & Bessant, 2007).

Organisations have different levels of AC, and so they seek to develop and strengthen the routines that influence their ability to learn. Two complementary types of learning are involved, firstly adaptive learning to reinforce and establish the routines to deal with a particular level of complexity, and secondly, generative learning, to help the firm take on new levels of complexity e.g. new knowledge associated with new technologies, adjacent and peripheral environments, and cultures (Schoemaker & Day, 2009; Senge, 2006; Tidd & Bessant, 2013).

AC enables a company's researchers: "To prioritize potential research avenues and avoid costly and time-consuming research trials that end in failure or low-valued outcomes" (Fabrizio, 2009, p. 256). March (2006) observes that the firm's AC, built up over time through managing R&D projects, enables the organisation to evaluate good and weak R&D opportunities. Through controlling bet sizes during exploration phases: "Bad ideas can be sorted from good ones at a cost that is less than the return generated by the few good ones when they are scaled up" (March, 2006, p. 210).

Organisations with lower levels of AC tend to pursue more speculative exploratory R&D, with less criteria available to evaluate between good and bad R&D opportunities. These organisations bear the higher cost of exploratory R&D without benefitting from high levels of discovering new types of knowledge (Swift, 2015).

2.28.4 Networks

The importance of networks to innovation search was foreseen by Rothwell's pioneering work, which saw a transition from organisations managing a linear R&D push or demand pull process to a situation of growing inter-activity (Gardiner & Rothwell, 1985; Rothwell, 1977). Some of the first moves that organisations make are to establish cross-functional teams, and increase collaboration with suppliers. These initiatives are then typically developed towards connections with external actors. Rothwell's vision in the 1990s of a "fifth generation" of innovation with deep and far reaching connections supported by IT supported communication envisaged the context within which innovation takes place today (Rothwell, 1992).

The importance of networks to business growth is now well established (Gulati, Puranam, & Tushman, 2009; Gulati, 2007). Adner highlights the crucial role of innovation ecosystems. Importantly, he identifies the role of major and supporting complementors to lead firms, with the attendant innovation risk inherent in innovation eco-systems as they get more complex (Adner, 2006, 2013). Adner uses the lenses of co-innovation risk and adoption chain risk to identify challenges that innovators need to sense and respond to (Adner & Kapoor, 2010; Adner, 2013).

Visible relationships with high-profile and respected organisations lead to more positive perceptions of the company's innovation by other key actors in the organisation's network (Podolny & Stuart, 1995; Stuart & Podolny, 1996), which then leads to more high-status partners joining the network of relationships (or ecosystem) surrounding the company. Following this view, too many partners, particularly if they are of low status, can reduce the attractiveness of an innovation if they suggest low quality to the rest of the ecosystem (McGrath & Kim, 2014).

While strategy scholars have typically looked at the comparative performance of particular companies, innovation scholars have long understood that breakthroughs are usually supported by networks (Adner, 2013; Hargadon, 2003). Successful innovation typically draws on a mix of companies, investors, universities, corporate and government research labs, suppliers and customers. In an era of hypercompetition and transient advantage, the network of actors outside the boundaries of the organisation has become even more important to the understanding of innovation and strategic performance. Contributors to innovation are not restricted to for-profit companies. The bio-technology sector shows how universities and public research organisations are essential for success (Powell, White, Koput, & Owen-Smith, 2005).

Networks have a major effect on the adoption and diffusion of innovation. A network can influence the actions of its members in two ways (Gulati, 1998). Firstly, through the flow and sharing of information within the network. Secondly, through the differences in the position of actors in the network, which cause control and power imbalances. The position an organisation occupies in a network is of great strategic performance, and reflects their relative power and influence in the network. Sources of power include technology, trust, expertise, economic strength, and legitimacy (Garud & Kumaraswamy, 1993). Networks are useful where the benefits of co-specialisation, sharing of standards and joint infrastructure, and other network externalities outweigh the costs of maintaining and providing governance to the network. Where there are high transaction costs connected with buying technology, network approaches can be more appropriate than market models. Where there is uncertainty, a network approach can be superior to acquisition or full integration (Tidd, 2010).

Innovation networks offer more than just ways to bring together and deploy knowledge in complex environments. They can also have “emergent properties” – the potential for the wider network to deliver more than the sum of its parts.

Organisations in effective knowledge networks benefit from collective knowledge efficiency, access to different and complementary knowledge sets, reducing risks through sharing experience, access to new markets and technologies, and the pooling of complementary skills and assets (Tidd, 2010).

Networks can be tight or loose, depending on the quantity (number), quality (intensity) and type (closeness to core activities) of the links or interactions. Links are more than individual transactions, requiring major investments in resources over time. Historically, networks have often evolved from long-standing business relationships. All companies have a group of partners that they do business with regularly, e.g. suppliers, distributors, customers, competitors and universities (Bidault & Fischer, 1994). Over time, mutual knowledge and social bonds develop through repeated dealings, increasing trust and reducing transaction costs (Hakansson, Ford, Gadde, Snehota, & Waluszewski, 2009). Therefore, an organisation is more likely to work with members of its network when it comes to buying or selling technology (Bidault & Fischer, 1994).

A study of 53 research networks identified two distinct dynamics of formation and growth (Doz, Olk, & Ring, 2000). The first type of network involves emergent processes, which develop due to changes in the environment, similar views among potential members and common interests. In the second, the process is engineered (Conway & Steward, 1998), requiring some triggering entity to form and develop. In the engineered network a nodal organisation actively recruits potential members to form a network or consortium, sometimes without the rationale of environmental interdependence or similar interests (Doz et al., 2000).

Tidd and Bessant (2013) have summarised how engineered networks can be configured, identifying nine network types: entrepreneur-based; internal project teams; communities of practice; spatial clusters; sectoral networks; new product or

process development consortium; new technology development consortium; emerging standards and supply chain learning.

The formation processes of networks have been studied (Ring, Doz, & Olk, 2005), identifying different managerial activities at different stages of the development of the network. Research indicates that two main activities are involved for companies building connections in networks: identifying the relevant new partners, and learning how to work with them. The process is somewhat like the development of effective teams (forming, storming, norming and performing), but the process has three stages: finding, forming and performing (Birkinshaw et al., 2007). Barriers to success in the process are geographical; technological; institutional; ideological; demographic and ethnic. Managing activities within the firm is complex, but managing within networks multiplies the level of complexity greatly (Gulati, 2007; Davis & Eisenhardt, 2011). As networks move through the set-up, operating and sustaining/closure stages, Tidd and Bessant (2013) have identified some generic challenges for organisations operating within networks:

1. How to manage something the organisation does not own or control
2. How to see system-level effects, not narrow self-interests
3. How to build shared risk-taking and trust without over-complex documentation and legal frameworks
4. How to minimise unintended consequences and spillovers

Research into organisational learning suggests that it is not just the number of alliances that matters, and that a broader selection of partnerships is advantageous, even if the immediate economic returns are not obvious. Working with a broad selection of firms has been shown to bring even more relationships, increasing demands on the company's absorptive capacity and its capability to adapt to different environments. The ability to collaborate is critical, and involvement in networks is an "admission ticket" to increasingly diverse future collaborations (Powell et al., 1996).

Understanding social networks has long played a role in management research (Öberg, Henneberg, & Mouzas, 2007; Tichy, Tushman, & Fombrun, 1979). The more diverse an individual's social network, the more likely that individual is going to be

innovative (Dyer, Gregersen, & Christensen, 2009b; Parise, Whelan, & Todd, 2015). Parise et al. have researched into the use of social networks identifying the roles of “idea scouts” and “idea connectors” (Parise et al., 2015; Whelan, Parise, Valk, & Aalbers, 2011) in a digitally enabled era of social networks. This work builds on Burt’s seminal research into structural holes (Burt, 2000, 2004). The importance of social networks to the innovation enterprise concerns both collaboration with a firm’s internal networks (Hansen, 2002), and with external organisations and individuals (Dahlander & Wallin, 2006). Open innovation relies on the widening of networks, including social networks (Chesbrough & Appleyard, 2007; Laursen & Salter, 2006).

The digital era increases access to data, increasing the ability to analyse the social networks in place in business ecosystems (Crescenzi, Nathan, & Rodríguez-pose, 2016; Kim, Choi, Yan, & Dooley, 2011). While the flow of information, ideas, professional and social contacts appears to suggest that the digital environment makes it easier to analyse contacts and developments within social networks, Conway sounds a warning about the ethics of Social Network Analysis (SNA) (Conway, 2014).

2.28.5 Mergers and Acquisitions

A number of key factors influence the degree of engagement, and the probability of activity in acquiring external organisations considering innovation contexts: the size and characteristics of the technological innovativeness of the organisations involved, their performance, and the nature of the environment (Ahuja & Novelli, 2014). Companies with declining levels of internal productivity have a need and greater likelihood of acquisition activity to increase their R&D options than those that are effective at developing opportunities through company centred activity (Higgins & Rodriguez, 2006). Alternatively, an acquirer’s strong performance in innovation activities can also lead to acquisition activity (Kaul, 2012). This can be the case because M&A does not just concern access to new knowledge, but can also represent effective and efficient means to secure complementary capabilities for commercialisation in response to a new technological innovation with significant potential (Ahuja & Novelli, 2014; Markides & Geroski, 2005).

A technologically stronger target has the potential to increase focal company knowledge (Ghoshal, 1987; Hitt, Hoskisson, Johnson, & Moesel, 1996). The RBV argues that that the level of technology resources of the acquisition target can support the choice of M&A over alliance, to tighten secure access to the relevant capabilities and resources (Villalonga & McGahan, 2005).

Firms with lower levels of specialised knowledge can see M&A as a route to diversification, and are more likely to pursue them (Miller, 2004). Additionally, aspects of the knowledge seen as valuable to the acquirer, such as its uniqueness, or inimitability, also leads to a greater incidence of acquisitions as compared to alliances and other governance options, due to greater concerns over the opportunism of other parties (Schilling & Steensma, 2002). A mix of acquisitions and alliances have been seen to grow faster than their competitors using a narrower set of options (Dyer, Kale, & Singh, 2004).

The performance of the firms involved in acquisition – both acquirer and target, influences the likelihood of acquisition (Ahuja & Novelli, 2014). Firms growing through acquisition have reduced levels of R&D intensity than matched competitors who develop innovation activity centred on the firm (Miller, 2004). The likelihood of acquisition increases when the focal firm's level of performance falls below expected levels, and when organisational slack is available (Iyer & Miller, 2008). Companies are susceptible to acquisition when the face major hurdles such as CEO search, a funding round, or failures of their own (Graebner & Eisenhardt, 2004).

The nature of the technological environment also affects the incidence of M&A. The acquisition of small technology centred firms is a common option to secure knowledge, capabilities and resources in rapid change technology environments (Ahuja & Novelli, 2014; Granstrand & Sjolander, 1990).

While many organisations undertaking M&A identify innovation as their prime goal, and some researchers have found a positive influence on the innovation outcomes of the acquirers (Capron et al., 1998; Desyllas & Hughes, 2010), many studies have shown a negative relationship between acquisition intensity and the level of internal innovation caused by the demands of preparation, negotiations and integration

activities (Hitt et al., 1996). A further limiting impact on innovation stems from managers over-estimating their capacity to manage an acquired firm (Hitt, Hoskisson, & Harrison, 1991).

Acquisitions regularly lead to more limited innovation impacts than anticipated (Chaudhuri & Tabrizi, 1999). M&A can reduce the productivity of inventors (Kapoor & Lim, 2007), often leading to key inventors exiting the acquired company (Ernst & Vitt, 2000).

2.28.6 Summary: Knowledge

The literature review has explored the wider role of knowledge within the innovation process, and has considered the significance of the knowledge of individuals, absorptive capacity, networks and mergers and acquisitions to firms.

Exposure to the literature suggests that organisations operating in the disrupting HE publishing sector will benefit from operationalising the following capabilities:

- Accessing knowledge through individuals with experience and knowledge from outside the core publishing industry
- Identifying and validating external acquisition and investment opportunities
- Acting on analysis of external organisations, investing in, acquiring, and/or collaborating (through alliances and partnerships) with external organisations

2.29 Literature Review Summary

The literature review has demonstrated that strategic management has generally focused on the exploitation part of the wave of competitive advantage, where advantages – either for incumbents or challengers – are clearly established. Strategy has typically focused on competitors, best allocation of resources, and the continuation of the dominant business model of the firm. In this world, innovation takes place on a “do better” basis, with larger innovation breakthroughs happening episodically. With advantages “built to last”, radical innovation by incumbents is not the order of the day.

Incumbents do well in environments that they understand, and they have sophisticated tracking mechanisms to monitor incremental changes and developments in their core markets. Balancing exploitation and exploration innovation search activities is straightforward in a relatively stable context, but the research of Christensen and others on disruptive innovation indicates that in certain unstable conditions (such as new technology, radically different cost structures etc.) incumbents can be surprised and get into difficulties (Christensen, 1997; Schumpeter, 1942a; Sull, 2009; Tripsas & Gavetti, 2000). Organisations face the paradox of how to establish search routines for focal markets while also setting up routines to sense and respond to disruptive and inconvenient innovation signals from peripheral markets to survive and grow (Day & Schoemaker, 2006; Kaplan et al., 2003; Sull, 2009). However, Day and Schoemaker's major work on peripheral vision took place during the period 2003-2006, and there is a gap in the literature regarding how organisations establish search routines to enable peripheral vision in pervasive digital environments.

McGrath (2012, 2013) has articulated an era of transient competitive advantage, with new categories emerging which she conceptualises as arenas: "Characterized by particular connections between customers and solutions, not by the conventional description of offerings that are near substitutes for one another" (McGrath, 2013a, p. 9). She considers that: "The most substantial threats to a given advantage are likely to arise from a *peripheral or nonobvious location*" (McGrath, 2013a, p. 10). A focus on users, and jobs-to-be-done in a disrupting, digital workflow has emerged (Bettencourt et al., 2014; Christensen et al., 2007; Ulwick, 2002).

The literature review has identified 11 capabilities that support the management of innovation search and select in disrupting environments, and suggests that a company's NPD outcomes will be enhanced if they:

1. Are guided by a high level, portfolio driven strategic plan supported by appropriate structures considering core, adjacent and breakthrough (or transformational) environments
2. Search the periphery for innovation and NPD opportunities
3. Operationalise structured search and select processes across core, adjacent and breakthrough (or transformational) environments
4. Seek out and share deep contextual domain insights, e.g. macro social and technology trends
5. Seek out and share deep domain insights into user workflows
6. Deploy digital era market research techniques, e.g. netnography
7. Identify and validate "big enough" pervasive problems and jobs-to-be-done
8. Validate and iterate opportunities through MVP testing and learning
9. Recruit, connect with and learn from individuals outside the core industry
10. Identify and validate external acquisition and investment opportunities
11. Act on strategic analysis, investing in, acquiring, and/or collaborating with external organisations

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

The previous chapter revealed a number of gaps in the literature which provided the basis for developing the research question and objectives that form the focus of this thesis. This chapter describes and supports the methodology used to address the research question, with the aim of demonstrating that appropriate methods and techniques were deployed during the research project.

The philosophical foundations underpinning the research are briefly discussed, considering both the ontological and epistemological assumptions (the research paradigm) and the particular methods and techniques used in the research process (the research design).

3.2 Research question and objectives

The thesis addresses the research question: How do organisations manage innovation search and select in disrupting environments?

Seven research objectives were developed, to mobilise the research project.

Search	Select
Research Objective 1: How do organisations manage innovation search in core markets in disrupting environments?	Research Objective 2: How do organisations manage innovation select in core markets in disrupting environments?
Research Objective 3: How do organisations manage innovation search in adjacent markets in disrupting environments?	Research Objective 4: How do organisations manage innovation select in adjacent markets in disrupting environments?
Research Objective 5: How do organisations manage innovation search in breakthrough areas in disrupting environments?	Research Objective 6: How do organisations manage innovation select in breakthrough areas in disrupting environments?
Research Objective 7: What is the influence of context on the operationalisation of innovation search and select capabilities in disrupting environments?	

Table 3.1: Research objectives 1-7

Having outlined the research question and objectives that emerged from the literature review, discussion will now turn to a brief outline of the research approach, which was guided by the research objectives, and the nature of the problem being explored.

3.3 Research philosophy

This section outlines the research philosophy which guided the study. At every stage of a research project the researcher makes assumptions (Saunders, Lewis, & Thornhill, 2012). Assumptions about knowledge, and the nature of the realities encountered during the research process, shape the researcher's understanding of their research questions, the methods used, and the interpretation of findings (Crotty, 1998). The research philosophy adopted can be seen as the assumptions about the way in which the researcher views the world. Philosophical assumptions underpin the research strategy, and the methods selected to realise the research strategy (Saunders et al., 2012).

The term worldview can be used to mean "a basic set of beliefs that guide action" (Guba, 1990 p.17). They have also been called *paradigms* (Lincoln, Lynham, & Guba, 2011), *epistemologies* and *ontologies* (Crotty, 1998), or *broadly conceived research methodologies* (Neuman, 2009). Worldviews arise due to discipline orientation, the inclinations and experiences of students' tutors, and previous research experiences (Creswell, 2014).

3.3.1 Ontology: the nature of reality

Ontology is concerned with the nature of reality, and serves to challenge the assumptions researchers have about how the world works, and their commitment to different viewpoints. Business and management researchers are typically drawn to two aspects of ontology, objectivism and subjectivism. Objectivism represents the position that social entities, such as companies, exist in a reality external to and independent of social actors. A theoretical position closely aligned to objectivism is positivism (Gray, 2014). This view places importance on the structural aspects of management, and assumes that management is consistent in all organisations

(Saunders et al., 2012). This world view is also called postpositivist research, empirical science, and postpositivism (Creswell, 2014). Postpositivism represents thinking after positivism, which challenges the established concept of the absolute truth of knowledge (Phillips & Burbules, 2000).

The debate on ontology and epistemology is often seen as a choice between positivist and interpretivist research philosophies, or between qualitative and quantitative methods (Saunders et al., 2012). Social researchers can follow the key themes of their training, rather than recognising that cognisance of philosophical assumptions presents the opportunity to increase the quality of research and support the creativity of the researcher. More recently a view has developed suggesting that it is more appropriate for a researcher managing a study to think of the philosophy adopted as a multi-dimensional set of continua rather than separate positions (Niglas, 2010).

There is also significant confusion in the researcher community concerning terms such as epistemology and ontology (Easterby-Smith, Thorpe, & Jackson, 2012), and the table below provides a useful summary and sequencing of these terms.

Ontology	Philosophical assumptions about the nature of reality
Epistemology	A general set of assumptions about ways of inquiring into the nature of the world
Methodology	A combination of techniques used to enquire into a specific situation
Methods and Techniques	Individual techniques for data collection, analysis, etc.

Table 3.2: Ontology, epistemology, methodology and methods and techniques (Easterby-Smith et al., 2012, p. 18)

3.3.2 Ontology: The main traditions

Within the main ontological traditions there are different positions. In the field of natural science, philosophers debate the merits of realism and relativism. Direct realism argues that what we experience through our senses portrays the world accurately, while critical realists take the position that our experiences are sensations of images of things in the real world, not the things themselves (Saunders

et al., 2012). More recently, philosophers of science have emphasised the difference between the laws of physics and nature, and the knowledge or theories that scientists develop about these laws. Bhaskar (1989) has labelled this position as transcendental realism, assuming that “the ultimate objects of scientific inquiry exist and act (for the most part) quite independently of scientists and their activity” (1989, p. 12).

Research into business and management concerns the social world in which the organisations, individuals and the researcher exist. Critical realists such as Bhaskar (1989) argue that it is only possible to understand the social world if we make sense of the social structures that have supported the creation of the phenomena that the researcher is trying to understand (Saunders et al., 2012), as what the researcher can see is only a part of a bigger picture. Bhaskar goes on to argue that it is possible to identify what we cannot see physically through the practical and theoretical processes found in the social sciences (Bhaskar, 1989).

In addition, it is important to establish the difference between direct and critical realism considering research into business and management. Direct realism suggests that the world is relatively unchanging. However, a researcher from the critical realist tradition would accept the importance of researching on different levels (e.g. the individual, the team/group and the organisation) (Saunders et al., 2012). Critical realism considers a wide range of structures, routines and processes, and the way that these structures, routines and processes interact together.

Internal realism assumes that a single reality exists, but takes the position that a scientist is never able to access that reality directly, as it is only possible to collect indirect evidence of what occurs in fundamental physical processes (Putnam, 1987). As an ontology, internal realism has little bearing on social science research, as it accepts that scientific laws, once discovered, are absolute and independent of additional research (Easterby-Smith et al., 2012), which has little connection with the dynamic socially constructed world explored by business and management researchers.

Relativism suggests that scientific laws do not merely exist, waiting to be discovered, but that the laws are created by people. This approach is powerfully influenced by Latour and Woolgar (1979), who explored how scientific ideas develop within scientific laboratories, noting the social interchanges, debate and discussion as scientists strive to explain observed phenomena and patterns. With people holding different views, the ability to gain acceptance from peers may depend on their reputation and status (Easterby-Smith et al., 2012). Additionally, the acceptance of a theory, and hence the prevailing state of a scientific debate, can be powerfully influenced by organisational and community politics, and commercial resources (Knorr-Cetina, 1983).

Within the social sciences, researchers are primarily interested in the behaviour of people, which leads to a debate concerning the appropriateness of the assumptions and methods of the natural sciences to the social sciences (Blaikie, 2007). The view of Easterby-Smith et al. (2012) is that the appropriateness of assumptions and techniques depend on both the research topic and the preferences of the researcher. Relativists accept that different researchers may have different viewpoints.

As we draw to the close of this brief review of ontology, we consider nominalism, which suggests that the names and labels given to events and experiences are highly influential. Some writers (Cuncliffe, 2001) see social life – in multiple contexts – to be indeterminate arguing that social reality is merely created by people through language and discourse (Cooper & Gibson, 1988).

The table below provides a working summary of the four different ontologies reviewed above.

Ontology	Realism	Internal Realism	Relativism	Nominalism
<i>Truth</i>	Single truth	Truth exists, but is obscured	There are many “truths”	There is no truth
<i>Facts</i>	Facts exist and can be revealed	Facts are concrete, but cannot be accessed directly	Facts depend on the viewpoint of the observer	Facts are all human creations

Table 3.3: Four different ontologies (Easterby-Smith et al., 2012, p. 19)

3.3.3 Epistemology: Positivism versus Social Constructivism

Epistemology concerns what is seen as acceptable knowledge in a research field. An ongoing debate amongst social scientists has centred on the relative merits of how social science research is best carried out, considering positivism and social constructivism.

3.3.4 Positivism

Positivism aims to explain, describe and predict phenomena in an objective world which is assumed to exist independently of the context and of the observer (Meredith, 1998). In taking a positivist stance, the researcher and the phenomenon are separate, and the phenomenon does not alter as it is being observed. It is a way of exploring unique, common realities using objective research methods (Easterby-Smith et al., 2012). Positivist studies aim to identify truths that can be translated into generalizable laws (Saunders et al., 2012). Social scientists who follow a positivist approach deploy methods originally developed in the natural sciences to study social reality (Greetham, 2006).

Postpositivists adopt a deterministic philosophy in which causes determine outcomes or effects. The knowledge developed through a postpositivist approach is built on developing numeric measures of observations (Creswell, 2014). Postpositivism takes the view that there are laws or theories that govern phenomena, and that these need to be tested so that we can understand the world. In the scientific method, the accepted approach to enquiry for postpositivists, a researcher embarks on the research process with a theory, collects data that supports or refutes the theory before carrying out additional tests (Creswell, 2014).

Positivism has developed into a distinct paradigm over the last 150 years. The term “paradigm” has become popular amongst social scientists, particularly driven by the work of Kuhn (1962), who used it to explain the development of scientific discoveries in practice, as distinct from how they are later rationalised within text books and scholarly journals (Easterby-Smith et al., 2012). According to Kuhn, most of the time science develops through small steps, which refine and extend what is already “known”. But if typical science is a puzzle-solving activity, and if it persistently fails to solve problems, then the failure of existing rules leads to a search for new ones

(Gray, 2014; Greetham, 2006). It is clear from looking at the scientific breakthroughs of a Galileo or Einstein that major scientific advances are not just through the logical and incremental application of the scientific method. Breakthroughs come from creative thinking outside the boundaries of existing ideas. The combination of new theories and questions is now referred to as a new paradigm (Easterby-Smith et al., 2012; Greetham, 2006; Kuhn, 1962).

3.3.5 Subjectivism

Other researchers hold a different worldview. Subjectivism takes the view that social phenomena are created from the perceptions and resulting actions of social actors (Saunders et al., 2012). Constructivism or social constructivism (regularly combined with interpretivism) is the new paradigm that has been developed through the last 50 years or so, in response to the application of positivism to the social sciences. This new paradigm takes the view that “reality” is not exterior and objective (Easterby-Smith et al., 2012), but it is socially constructed, with individuals developing subjective meanings of their own experiences (Creswell, 2014). The concepts came from Berger and Luckman’s “The Social Construction of Reality” (Berger & Luckmann, 1991), Watzlawick (1984) and Lincoln and Guba’s “Naturalistic Inquiry” (1985) amongst others. Social constructionism focuses on the ways that people make sense of the world, especially through sharing their experiences with others through the use of language (Easterby-Smith et al., 2012).

Social constructionist researchers look for the complexity of views, rather than narrowing meanings into a few categories or ideas. Questions become broad and general, so that research participants can construct the meaning of a situation, typically through interactions and discussions with other people. The aim of the researcher is to make sense of (or interpret) the meanings that others have about the world. Instead of starting with a theory (as is the case in postpositivism), researchers generate or inductively develop a pattern or theory of meaning (Creswell, 2014).

The table below summarises a composite picture which contrasts the methods of social constructionist research with the eight key features of classical positivist research.

	Positivism	Social Constructionism
The observer	Must be independent	Is part of what is being observed
Human interests	Should be irrelevant	Are the main drivers of science
Explanations	Must demonstrate causality	Aim to increase general understanding of the situation
Research progresses through	Hypotheses and deductions	Getting rich data from which one's ideas are induced
Concepts	Need to be defined so that they can be measured	Should incorporate stakeholder perspectives
Units of analysis	Should be reduced to the simplest terms	May include the complexity of "whole" situations
Generalisation through	Statistical probability	Theoretical abstraction
Sampling requires	Large numbers selected randomly	Small numbers of cases chosen for specific reasons

Table 3.4: Contrasting implications of positivism and social constructivism (Easterby-Smith et al., 2012, p. 24)

3.3.6 Pragmatism

Pragmatism stems from the work of Peirce, James, Mead, and Dewey (Cherryholmes, 1992), and arises out of actions, situations and consequences rather than antecedent conditions, as is the case in postpositivism (Creswell, 2014). The concern is with what works, and solutions to problems (Patton, 1990). The essence of pragmatism is that any meaning structures come from the lived experience of individuals (Easterby-Smith et al., 2012), and has had a major influence on theories of learning within organisations, with Kolb's Learning Cycle a notable example (Kolb, 1984). Rather than focusing on methods, researchers concentrate on the research problem and use all of the relevant approaches available to understand the problem (Rossman & Wilson, 1985). Pragmatism is often seen as a philosophical underpinning for mixed methods studies (Morgan, 2007; Patton, 1990; Tashakkori & Teddlie, 2010), as it focuses attention on the research problem in social science

research, setting up the use of a mix of research methods to derive knowledge about the problem.

3.3.7 Connecting ontology, epistemology and methodology

Most of the central debates between philosophers involve matters of ontology and epistemology. Ontology concerns the nature of reality and existence. Epistemology considers the most relevant and effective ways of enquiring into the nature of the world. Social scientists and scientists typically draw on different ontological and epistemological assumptions when developing what they see as the most advantageous methodologies for conducting research (Easterby-Smith et al., 2012).

Easterby-Smith et al. (2012) note the link between epistemology and ontology, and they introduce a difference between stronger and more normal stances of constructivism and positivism. Ayer (1936, p. 50) identified the distinction between statements that are either directly, or only indirectly verifiable. The idea of “normal” constructionism refers to researchers who construct their own knowledge, while respecting the existence of independent, objective knowledge.

We are now in a position to align ontologies, epistemology and methodology, which helps the social scientist to select appropriate research methodologies to pursue their research project. The table below helped the researcher to build thinking towards selecting final research methodologies.

Ontologies	Realism	Internal Realism	Relativism	Nominalism
Epistemology	Strong Positivism	Positivism	Constructionism	Strong Constructionism
Methodology				
Aims	Discovery	Exposure	Convergence	Invention
Starting points	Hypotheses	Propositions	Questions	Critique
Designs	Experiment	Large surveys; Multi-cases	Cases and surveys	Engagement and reflexivity
Data types	Numbers and facts	Numbers and words	Words and numbers	Discourses and experiences
Analysis/ Interpretation	Verification/ falsification	Correlation and Regression	Triangulation & comparison	Sense-making; understanding
Outcomes	Confirmation of theories	Theory testing and generation	Theory generation	New insights and actions

Table 3.5: Methodological implications of different epistemologies (Easterby-Smith et al., 2012, p. 25)

A researcher with a constructionist stance takes the view that there may be different realities, and so the researcher obtains multiple perspectives through a mixture of different qualitative and quantitative techniques, collecting the views and experiences of a range of individuals and organisations (Easterby-Smith et al., 2012). Triangulation is used to seek convergence, corroboration, and the correspondence of results from different methods (Gray, 2014: 198), and is based on the idea that a ship's navigator needing to pinpoint their position would take compass bearings on three separate landmarks to identify the location of a ship.

3.3.8 Critical realism

The past two decades have seen many management and organisational researchers adopting critical realism, as it takes a compromise position in between the stronger aspects of positivism and constructionism. Critical realism uses the idea of a “structured ontology”, separating out three levels: the empirical domain, made up of the of the experiences and perceptions that people have; the actual, comprising the actions and events that take place, even if they are not observed or detected; and the real, made up of mechanisms and causal powers that cannot be detected directly, but which have a real impact on individuals and society (Bhaskar, 1978, p. 13).

3.3.9 Research approaches

Researchers have to make a decision about the reasoning approach that will serve their project the best, and it is often seen that the options are deductive or inductive (Saunders et al., 2012). Deductive reasoning takes place when the conclusion is derived logically from a set of premises, with the conclusion being true when all the premises are true (Ketokivi & Mantere, 2010). Inductive reasoning works through identifying a gap in the logic argument between the premises observed and the conclusion, with the conclusion being supported by the observations made (Ketokivi & Mantere, 2010). The third, widely used reasoning approach is abductive reasoning, which begins with a “surprising fact” being identified (Ketokivi & Mantere, 2010). The surprising fact is the conclusion rather than the premise. Through focusing on this conclusion, a set of possible premises can be identified that are considered sufficient, or nearly sufficient, to explain the conclusion. The reasoning flows that if this set of premises was true, then the conclusion would also be true (Saunders et al., 2012).

The table below summarises the main aspects of deduction, induction and abduction.

	Deduction	Induction	Abduction
Logic	In a deductive inference, when the premises are true, the conclusion must also be true	In an inductive inference, known premises are used to generate untested conclusions	In an abductive inference, known premises are used to generate testable conclusions
Generalisability	Generalising from the general to the specific	Generalising from the specific to the general	Generalising from the interactions between the specific & the general
Use of data	Data collection is used to evaluate propositions or hypotheses related to an existing theory	Data collection is used to explore a phenomenon, identify themes and patterns and create a conceptual framework	Data collection is used to explore a phenomenon, identify themes and patterns, locate these in a conceptual framework and test this through subsequent data collection and so forth
Theory	Theory falsification	Theory generation and building	Theory generation or modification; incorporating existing theory where appropriate, to build new theory or modify existing theory

Table 3.6: Deduction, induction, and abduction: from reason to research (Saunders et al., 2012, p. 144)

3.3.10 Abduction

An abductive approach moves between data and theory, effectively combining induction and deduction (Suddaby, 2006), and this matches what Saunders et al. (2012) note is what many business and management researchers actually do. Van Maanen, Sørensen, & Mitchell (2007) observe that some credible theories can explain what is observed better than others, and that it is these theories that stand the best chance of helping to reveal more “surprising facts”. Deduction and induction

complement abduction as logics for testing credible theories (Van Maanen et al., 2007).

3.3.11 Bringing together thoughts on research philosophy and research approaches

The methodology chapter has surveyed the literature concerned with research philosophy, and research approaches. The author has found the research “onion” (Saunders et al., 2012, p. 128) useful as a means of identifying their own research philosophy and research approach.

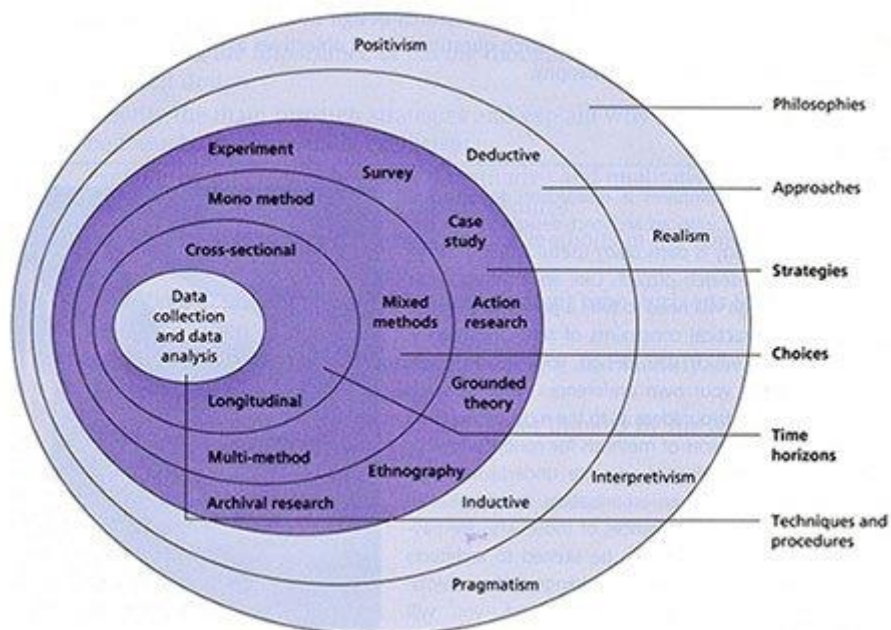


Figure 3.1: The research onion (Saunders et al., 2012, p. 160)

The researcher is now able to summarise their ontological and epistemological stance:

Ontology	The researcher has approached the project as a relativist, assuming that different researchers have different viewpoints, and this assumption was supported by the literature review.
Epistemology	The researcher holds the view that reality is socially constructed, and seeks to inductively develop patterns or theories of meaning through the study. Through adopting a pragmatic approach, the researcher has focused on real-world, practice orientated research problems, choosing relevant approaches to understand them. Pragmatism is frequently seen as underpinning mixed methods and techniques.

Table 3.7: Research project ontology and epistemology

It is now time to consider a range of methods to explore the research question and research objectives.

3.4 Research method

“The worldviews, the designs, and the methods all contribute to a research approach that *tends* to be quantitative, qualitative, or mixed” writes Creswell (2014 p 17). The table below summarises the research methods that can be used to collect data, conduct analysis and enable interpretation.

Quantitative Methods	Mixed Methods	Qualitative Methods
Predetermined	Both predetermined and emerging methods	Emerging methods
Instrument based questions	Both open- and closed-ended questions	Open-ended questions
Performance data, attitude data, observational data, and census data	Multiple forms of data drawing on all possibilities	Interview data, observation data, document data, and audio-visual data
Statistical analysis	Statistical and text analysis	Text and image analysis
Statistical interpretation	Across databases interpretation	Themes, patterns interpretation

Table 3.8: Quantitative, mixed and qualitative methods (Creswell, 2014, p.17)

3.4.1 Criteria for selecting a research approach

The type of social research problem influences which approach might work most effectively. If the problem seeks to identify the factors that influence an outcome, or to understand the best predictors of outcomes, then a quantitative outcome typically works best. However, if a concept or phenomenon needs to be explored and understood as it has been under-researched up until now, then the researcher may well find that a qualitative approach is most appropriate (Creswell, 2014). Qualitative research may be needed if the topic is new, or the themes have not been addressed before with a particular sample (Morse, 1991).

3.4.2 Justification for using qualitative instead of quantitative research methods

A broad range of research methods were considered, including collecting data through surveys administered online. The dominant logic supporting survey based quantitative research is that responding individuals are willing to report their own thinking process, and the thinking process of others, using fixed-point scales to provide the nuance needed to capture the thinking/doing processes under study (Woodside, 2010, p. 2). If only one respondent is available for each organisationsurveyed, it is dangerous to extrapolate the views of one individual to wholly represent the state or thinking of that organisation. Survey research regularly fails to collect the detail needed to achieve deep understanding of the mechanics and reasons embedded in the processes being explored (Woodside, 2010, p. 9).

3.4.3 Qualitative research

Many qualitative design options exist, with Tesch (1990) identifying 28 approaches, and Wolcott 22 (2009). Creswell (2013) discussed five common traditions of qualitative inquiry from the options, highlighting narrative, phenomenology, ethnography, case study and grounded theory approaches.

3.4.4 Why the case study research (CSR) approach?

CSR is regularly used within the realist paradigm (Perry, 1998; Riege, 2003), and CSR is an appropriate research method to facilitate theory development in the field of management (Eisenhardt & Graebner, 2007; Eisenhardt, 1989; Meredith, 1993; Voss, Tsiriktsis, & Frohlich, 2002), including operational management issues.

A criticism of the case method in the social sciences from more positivist researchers is that the approach lacks the rigour of the natural sciences, with difficulties for the generalisation of findings from specific cases to the general population. A further challenge is that as case studies create huge amounts of data, researchers can use the data to support almost any interpretation that they favour (Yin, 2003). To counter these criticisms, Yin (2003) argues that all case studies should have clear plans ahead of data collection, covering the main propositions or questions, and his methods demand rigour when it comes to making comparisons between cases.

Yin (2003, p.13) proposes that “A case study is an empirical inquiry that investigates a contemporary phenomenon within its real life context, especially when the boundaries between phenomenon and context are not clearly evident.” Woodside (2010, p. 1) broadens this definition to: “CSR is an enquiry that focuses on describing, understanding, predicting, and/or controlling the individual (i.e. process, animal, person, household, organisation, group, industry, culture, or nationality).” CSR supports the deep understanding of the actors, interactions, sentiments and behaviours occurring for a process through time, and is well suited to the research project, which aims to understand how organisations manage innovation search and select in disrupting environments.

Stake (2006) looked at the differences between instrumental and expressive studies. Instrumental projects look at specific cases to try to develop general principles, while expressive studies explored cases to consider their unique features, whether they are or are not generalizable to other contexts. Siggelkow (2007) saw case studies as being highly effective in demonstrating the significance of particular research questions, for inspiring new ideas and supporting abstract concepts.

To achieve deep understanding in case study research, researchers seek to understand the “sensemaking” processes developed by individuals and organisations (Weick, 1995). However, the view (or mental model) of any one respondent, and the influences upon them, limits the identification of the significant details needed to deeply understand a process. The triangulation of methods, and multiple informants, are necessary to confirm and deepen information and understanding (Denzin, 2012; Jick, 1979). Triangulation often includes the direct observation by the researcher within the environments of the case, probing through asking interviewees to explain and interpret “operational data” (Van Maanen, 1979), and the analyses of documents and other artefacts (Woodside, 2010).

The objective of case study research isn't to generalise findings, but to probe theory (i.e. one or more of the mental models related to the processes being examined (Woodside, 2010; Yin, 2003). The case study research approach is often associated with qualitative research methods, but it is not appropriate to see case based research as being limited to one set of research methods. Indeed, quantitative approaches can be used for many CSR projects, and the quality of most studies can be enhanced by using a mix of research methods, and multiple study objectives (Pettigrew, 1990).

An intermediate approach to case study research has been developed by Eisenhardt in particular over the last twenty five years or so (Eisenhardt & Graebner, 2007; Eisenhardt, 1989). Her approach mixes elements from both the positivist and constructionist approaches, and is now widely used by case method researchers (Easterby-Smith et al., 2012 p. 56). She recommends using research methods established at the outset of projects, while also encouraging researchers to adapt their approaches as the project develops. To derive the most powerful insights, she endorses within case and across case analysis (Eisenhardt & Graebner, 2007). Eisenhardt looks to build theory from case based research, writing: “A major reason for the popularity and relevance of theory building from case studies is that it is one of the best (if not the best) of the bridges from rich qualitative evidence to mainstream deductive research. Its emphasis on developing constructs, measures, and testable theoretical propositions makes inductive case research consistent with the emphasis on testable theory within mainstream de-ductive research” (Eisenhardt

& Graebner, 2007 p. 25). She proposes that hypotheses can be developed through three main stages. The initial stage involves honing the basic constructs through an iterative “back and forth” process between the constructs and the data. Secondly, the emergent relationships between the constructs need to be validated by looking at the evidence from the cases, making the point that: “Each case is analogous to an experiment, and multiple cases are analogous to multiple experiments” (Eisenhardt, 1989 p.542). The third stage sees the emergent hypotheses/theories/concepts being compared with literature that the findings both endorse, and contradict, as ignoring contradictory findings undermines confidence in the final conclusions (Easterby-Smith et al., 2012). The table below summarises the key features of the case method in business and management research, informed by different epistemologies.

	Positivist (Yin)	Positivist and Constructionist (Eisenhardt)	Constructionist (Stake)
<i>Design</i>	Prior	Flexible	Emergent
<i>Sample</i>	Up to 30	4-10	1 or more
<i>Analysis</i>	Cross-case	Both	Within case
<i>Theory</i>	Testing	Generation	Action

Table 3.9: Key features of case method informed by different epistemologies (Easterby-Smith et al., 2012 p. 57)

The researcher selected Eisenhardt’s positivist and constructionist approach to case study research for the project due to it being a flexible approach offering the opportunity to identify and validate (or not) routines, and processes across multiple cases, and as it provides the scope to compare the innovation management processes and the influence of context of case companies of different size, with different missions.

3.4.5 Personal experience

The researchers' own training and experiences will also play their part in the choice of approach. A person well trained in statistics and SPSS who is targeting quantitatively orientated scholarly journals is likely to select quantitative methods. Researchers comfortable with highly systematic procedures may also prefer to work in this tradition (Creswell, 2014).

Alternatively, an individual with significant experience in managing personal interviews may tend towards the qualitative method, which may allow room for more creative and flexible approaches. Mixed method researchers will need to be confident with both qualitative and quantitative techniques, as well as having the time to deploy different research instruments.

3.5 Research design: Mobilising research philosophy and methods and to undertake the study

Influenced by exposure to the research philosophy and research methods literature, it is now time to turn to how the researcher selected and deployed appropriate research methods to undertake the research project.

Considering NPD search and select, the study was designed to explore the seven steps that Day and Schoemaker (2006, p. 5) identified in "Peripheral Vision" as being essential to bridging what they saw as the "vigilance gap":

- Step 1: Scoping: where to look
- Step 2: Scanning: how to look
- Step 3: Interpreting: what the data means
- Step 4: Probing: what to explore more closely
- Step 5: Acting: what to do with these insights
- Step 6: Organizing: how to develop vigilance
- Step 7: Leading: an agenda for action

3.5.1 Rationale for the selection of the case organisations

Following Eisenhardt's positivist and constructionist approach, and based on in depth knowledge of both the HE environment and the differing missions and scale of scholarly publishers operating in the HE market, ten case companies operating at a global scale in highly globalised HE publishing markets were selected. Comparisons are made between the findings from four large commercial companies, two medium sized commercial companies, two university owned publishers, and two society publishers.

Type Of Publisher	Number of Publishers
Large commercial companies	4
Medium commercial companies	2
University owned publishers	2
Society publishers	2
Total	10

Table 3.10: Case sample structure

The case companies are all incumbents, tracing back their publishing activities for an average of 178 years, making this set of case companies possibly one of the oldest on record.

The average length of service at each publisher was over 10 years, and the interviewees across all organisations sample had worked in publishing for an average of over 17 years. The interviewees collectively had 650 years of experience in their current companies, and 1,074 years of experience in total in publishing, as detailed in Appendix 7.

3.5.2 The 10 largest publishers, by number of journals

A table showing the relative size of the 10 largest publishers, by number of journals is below (Table 3.10). The research project engaged with six of the 10 largest publishers, by number of journals (Ware & Mabe, 2015). The quality of the case sample positively influenced the quality of the findings.

It should be noted that the number of journals published does not necessarily equate to financial turnover. Analysis of the Thomson-Reuters Journal Citation database indicate that the proportions of article output by type of publisher were: commercial publishers (including publishing for societies): 64%; society publishers: 30%; university presses: 4%; other publishers: 2% (Ware & Mabe, 2015, p. 45).

Publisher	Number of journals
Springer (before merger with Macmillan)	2,987
Elsevier	2,500
Wiley	2,388
Taylor & Francis	2,105
SAGE	750
Wolters Kluwer (inc Medknow)	672
Hindawi	438
Cambridge University Press (CUP)	350
OUP	362
Macmillan (NPG: Nature Publishing Group)	178

Table 3.11: The 10 largest STM publishers, by number of journals (Ware & Mabe, 2015 p. 45)

3.5.3 Access

The researcher is well networked in the academic publishing industry, having worked at board level for 12 years at one of the case companies, Emerald Group Publishing. He is also a Senior Consultant with CIBER Research, an organisation which researches into how very large numbers of people behave and consume in digital environment. Colleagues at CIBER made introductions leading to access at three large publishers and one university press.

An anonymised copy of the letter sent to contacts to secure access is in Appendix 1. A major achievement of the project was securing access to a high quality set of case companies.

3.5.4 Anonymising the Case Companies

The case companies were assigned simple identifiers as Case A, Case B etc., as shown below.

Case	Type of Publisher
Case A	Large commercial
Case B	Large commercial
Case C	Large commercial
Case D	Large commercial
Case E	Medium commercial
Case F	Medium commercial
Case G	University owned
Case H	University owned
Case I	Society publisher
Case J	Society publisher

Table 3.12: Case company identifiers

3.5.5 The researchers' own experience and anticipated access influenced the research method

The researcher has 27 years of business experience managing face to face meetings (interviews) with customers, has led teams (up to 100), developed networks of external contacts, and worked for 15 years as a board level director. This "outside in" (Day & Moorman, 2010) experience, and early exposure in sales roles to training in the use of open and closed questions, has nurtured skills in managing professional conversations and meetings through the careful use of questions. Marketing training, and the power of using questions in face to face environments was also inspired by Kipling's rhyme (1900):

*I keep six honest serving men
(They taught me all I knew);
Their names are What and Why and When
And How and Where and Who*

This experience heavily influenced the selection semi-structured interviews to explore the research question.

3.5.6 Time horizons: Longitudinal versus cross-sectional research

The cross-sectional "snapshot" study approach was taken, due to the need to conduct the research and submit the thesis within a limited time period. Having secured good access to the case companies, and generated significant amounts of data, the author may consider a more longitudinal approach in the future, if funding were to be available.

3.5.7 Interview sample

Influenced by critical realism tradition, the researcher took the view that it was important to collect data from staff at different levels, and from a range of disciplines, from a range of different types of HE publisher. Therefore a key objective in designing the study was to interview staff from senior level, e.g. CEO; MD; Vice President and their direct reports across a wide range of business disciplines so that a full picture could be established of how innovation activities are managed within HE publishers.

A number of market research experts were sought, due to the focus on the innovation search process. A list of the job roles interviewed, by case company, is in Appendix 2.

3.5.8 Structuring the interviews

A key task was structuring the interviews, to ensure that the data collection process generated material that covered both how the case companies managed their core business, but also “beyond the core”. The questions were designed following the literature review, which identified the key areas where the researcher wanted to explore more.

An earlier version of the semi-structured questions was tested with the CEO and Publishing Director of a scholarly publisher. The main developments following these two test interviewees were to formalise the timings of the interview, and to ensure that the “beyond the core” section received sufficient focus. The other main piece of feedback was confirmation of how little time some smaller organisations spend considering their business beyond the core.

The semi-structured interviews explored innovation activities in core areas of business (around 40% of the interview time), and beyond the core (also around 40% of the interview time). The flow of the interview was developed over an extended period, based on the literature review, and the researcher’s knowledge of the

publishing industry. While the series of interview questions numbered 29, during the time available, 12 – 16 questions were reliably asked.

As the interview process progressed, particular themes started to emerge that were particularly relevant to the research questions, and so the interviews were managed to ensure that answers were generated to these questions.

A copy of the agenda, which was not revealed to the interviewees, is in Appendix 3.

3.5.9 Subjectivity

Subjectivity can be defined as: “The ability or tendency to present or view facts in the light of personal or individual feelings or opinions” (Trumble & Stevenson, 2003, p. 3086). The researcher worked at board level for 12 years at one of the case companies, Emerald Group Publishing, and so approached the research project with a deep understanding of the HE publishing industry, as well as privileged information regarding one of the case companies.

The same interview structure was used with Emerald as with the other nine case companies, and the analysis undertaken throughout the research project was carried out with the researcher fully aware of the need for objectivity.

3.5.10 Ethics

The interviewees and interviewer all signed interview consent forms which confirmed that:

- The interviews were confidential and anonymised so participants cannot be identified individually from the data
- Where interviews were recorded and/or transcribed they would be coded in order to protect the identity of respondents. All files are be stored securely in accordance with the UK Data Protection Act.
- Any quotations and/or examples used in research outputs (such as reports, conference papers, presentations, etc.) will remain anonymous.

- Participation in the research was entirely voluntary. Participants were free to refuse to answer any question or terminate the interview at any point.

The Interview Consent Form, binding the researcher to respect academic protocols, can be found in Appendix 4.

The researcher worked at board level for 12 years at one of the case companies, Emerald Group Publishing, during the period 2000-2012. During the field work and write-up period of the research project (October 2014 - February 2016) the researcher did not undertake any paid work for Emerald Group Publishing.

3.5.11 Data collection: October 2014 – April 2015

The data has been collected through 61 mainly face to face semi-structured interviews with 63 senior staff at the level of CEO/Senior Vice President/Managing Director, and their direct reports. The interviews were mainly one on one (59), but two interviews involved the researcher interviewing two individuals at the same time. The sample also included a number of market insight specialists. The breakdown of job titles by organisation is available in Appendix 2. The interviews were mainly with UK based staff (53), and 10 individuals based in the US. Interview sessions typically lasted between 45 and 60 minutes, and were recorded, transcribed, and have been coded using NVivo software. Face to face interviews (53) were conducted in the main, and eight interviews took place using Skype. The field work was conducted between October 2014 and April 2015.

A total of 2,765 minutes (46 hours) of recorded material was captured during the process. Before the recorded interview took place, the researcher provided an outline to the project, including the other organisations involved, and the broad scope of the research. As part of the introduction, the researcher introduced each interviewee to Bessant and Tidd's simplified model of the innovation process (Tidd & Bessant, 2013 p. 47) and a representation of "Innovation Search: Core, Non-core and Digital Periphery 2014 – 2020", created by the researcher, as shown in Appendix 5.

3.5.12 Interview transcription

The interviews were transcribed by the researcher, and by Bristol Transcription Services, a professional transcription company.

3.5.13 Describing the portfolio of innovation environments

Building on the academic literature (Ansoff, 1957; Day & Schoemaker, 2006; Day, 2007; Nagji & Tuff, 2012), the portfolio of innovation environments and opportunities explored were defined as being:

Core markets or environments	Adjacent markets or environments	Breakthrough environments (Peripheral to the core business).
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Table 3.13: Description of portfolio of innovation environments

3.5.14 Coding and summarising the data: Case by case

With almost 3,000 minutes of interview material to consider, a key step was to design a practical format to help identify key quotes, and to assess the level of presence of the 11 innovation dynamic capabilities identified through the literature review. To achieve this task, a “Case Analysis Template” was designed, shown in Appendix 6.

While structuring the interview data using the Case Analysis Template, the researcher also considered the influence of context on the operationalisation of innovation search and select capabilities in disrupting environments, to support the achievement of Research Objective 7: “What is the influence of context on the operationalisation of innovation search and select capabilities in disrupting environments?”

3.5.15 Capability rating

While recognising that the study is qualitative in nature, to draw meaning, and to enable comparisons, a simple capability rating system was developed, as shown below:

3	Capability well established, with consistent and clear references to ongoing activities
2	Capability present, with some references to ongoing activities
1	Capability partially/patchily present, with limited supporting references to ongoing activities
0	No supporting reference s regarding current activities

Table 3.14: Capability rating system

It should be noted that Not Applicable (N/A) is used to assess the presence of the capability to search the periphery of the business environment relating to both core and adjacent markets, as this capability is only relevant when organisations are actively considering the periphery of their business environment for opportunities, or trends and organisations threatening their activities.

3.6 Reflections on the research approach following the data collection phase

While useful data was collected on the on the clarity of responsibility for identifying innovation & NPD opportunities, this data would have informed the discussion more helpfully if the data had been collected using a Likert scale

The data collected on knowledge management would also have been more helpful if it had been collected using a Likert scale. In addition, while the data helped to inform the discussion and may be useful in the future, the research project was focused on search and select, rather than the internal use of knowledge within organisations, limiting the contribution of this data to the discussion and recommendations.

The interview question: “Does the organisation have a systematic way of searching the periphery of your business environment for innovation and NPD opportunities?” was prompted by Fuld (2003) who revealed that 97% of corporate strategists did not have early warning systems in place. The data collected regarding systematic processes to search the periphery should have been sought using a Likert scale, as this would have made the findings more informative.

The interview process, and the semi-structured list of 29 questions, investigated how companies explore breakthrough opportunities in environments peripheral to the firm’s core business. The associated theme of vigilance (Day & Schoemaker, 2004a, 2006, 2008) could have been explored more in core, adjacent markets, as well as in breakthrough environments.

3.7 Development of the thesis through conference papers

The author has developed aspects of the thesis through writing conference papers, and has been the lead author and the sole presenter of two conference papers based on the research project at the 2014 and 2015 annual International Society for Professional Innovation Management (ISPIM) conferences. The researcher is the lead author on an additional paper that has been accepted for the 2016 ISPIM annual (June) conference.

3.8 Summary of ontology, epistemology, methodology, methods and techniques

Ontology	The researcher has approached the project as a relativist, assuming that different researchers have different viewpoints, and this assumption was supported by the literature review.
Epistemology	The researcher holds the view that reality is socially constructed, and seeks to inductively develop patterns or theories of meaning through the study. Through adopting a pragmatic approach, the researcher has focused on real-world, practice orientated research problems, choosing relevant approaches to understand them. Pragmatism is frequently seen as underpinning mixed methods and techniques.
Methodology	Though adopting a relativist ontology, and a pragmatic approach, the researcher embarked on the data collection phase with a set of questions, rather than a set hypotheses more suited to realism, or propositions more suited to internal realism. The researcher considered using both qualitative case studies and surveys to achieve the project's research objectives. However, due to the exploratory nature of the research project, it was not felt appropriate to deploy quantitative techniques for the current study. The use of quantitative methods would be appropriate as a part of the research mix in follow up studies with the case companies, or other companies within the publishing sector, or other sectors.
Methods and Techniques	The researcher undertook semi-structured interviews with 63 individuals identified within ten case companies from the HE publishing sector. The informants were made up of a range of levels, across different professional disciplines. A mix of mostly open-ended questions were deployed, with some closed questions. The analysis phase focused on text analysis, both within each case, and cross-case. The analysis was conducted using a case analysis template, and a capability rating system

Table 3.15: Summary of ontology, epistemology, methodology, methods and techniques

Having discussed in detail the relevant methodological aspects of the research project, the next chapter will present the findings from the data collection phase.

CHAPTER 4: FINDINGS

4.1 Introduction

Each interview opened with the researcher asking two open questions regarding change within the case company, and within the HE focused scholarly publishing arena, over the last five years. To help readers to understand the context within which the research was conducted, a summary of the main themes identified is included below.

4.2 Core Markets

4.2.1 Context: What has changed most within HE publishers in the last five years?

The period 1995-2010 saw the widespread move online of scholarly books, journals and other learning materials e.g. case studies. During this period, publishers were particularly focused on digitising content, moving processes online, changing business models from paper based products to multi-year agreements centred on digital collections, building relationships with authors and budget holders (librarians), and moving the publishing and sales emphasis from a strong North American and European focus to a significant connection with wider global (e.g. Asia Pacific) markets.

Historically, the subject knowledge of content focused publishing staff was at the heart of the growth of publishers, supported by efficient production and distribution processes complying with industry norms. The period 1995 – 2010 saw the development of extensive sales teams engaging directly with library customers, which largely replaced commercial processes enabled by intermediaries and agents.

Other vectors of growth included the acquisition and rapid integration of acquired content into the content portfolios of the publishers buying out smaller players. Acquisition helped publishers move into “new to them” subject areas, as well as

bulking up existing subject collections, with well funded STM subjects generating faster growth than the humanities and social sciences (HASS) subjects.

The visibility of the consumption of the products and services of publishers was transformed by digitisation, with the value delivered by publishers increasingly calculated by the cost per download of content bought on multi-year deals.

The interviews revealed the pressures on all of the case companies to keep up with the content delivery expectations of stakeholders such as researchers, teachers, students and librarians. The pressures came from the need to comply with formal industry standards, the performance of the digital platforms of the leading players, and the increased flexibility of mainstream digital systems, particularly pervasive social media platforms. An informant explained that the major publishers had been in a: “Functionality arms race”, focused on the technical performance of their platforms.

The introduction of digital workflows to manage content items (e.g. journal articles) through the publishing process had been a major part of the transformation of the industry into a leading digital environment. Publishers had moved from being primarily focused on content and logistics to, at the most progressive firms, being technology, content and workflow solution centred organisations with technologists inside. Their structures and processes experienced change, and they delivered content in flexible ways, as well as solving wider and deeper problems for users as they stretched for new opportunities beyond their core activities.

All the case organisations described how they had found it demanding to build the culture and processes to support innovation in organisations that had historically centred on content management above other factors. The change to a greater focus on innovation activities demanded different roles and capabilities than those needed in the “Core” publishing areas. They had to unlearn old routines, and learn new tricks.

The language in the interviews was about the ability to learn from failure, manage technology and innovation in agile ways, understand user workflows and create MVPs as prototypes with which to conduct experiments with users and customers. A recurrent theme was that the intense focus on building innovation capability and processes was all relatively recent, nicely summarised by an interviewee at a large publisher observing: “If you had come to interview us three or four years ago about innovation, we wouldn’t have had a lot to talk about, as the key issues for the previous decade, and even longer, were the digitisation of content, geographic expansion, and acquisition.”

4.2.2 HE sector context: What had changed most within the HE sector in the last five years, affecting publishers?

The research process revealed that HE markets for scholarly content were growing much more slowly than in the previous decade, pushing publishers to identify and secure revenues from new markets.

The greatest changes in the previous five years within the HE sector affecting publishers had included:

- The development of new business models, such as OA publishing, supported by major research funders such as governments, the Wellcome Trust etc. There was widespread acceptance of OA as an alternative business model by publishers. OA publishing was increasingly seen a mainstream activity, with publishers aiming to make it profitable in the medium to long term
- The visibility of usage data had been facilitated by industry standards projects such as COUNTER (2015). Having a standardised methodology for measuring the downloading (usage) of digital content had enabled buyers (librarians) and publishers to establish metrics to evaluate the average cost per download of a publisher’s product
- An expectation amongst funders, students and academics that research should be available digitally, and should be available for free wherever possible
- Greater use of digital resources across both teaching and research

- The globalisation of HE, typified by an explosion in research and research consumption in countries like China and Brazil
- The growth of HE globally
- The stagnation of library budgets, meaning that if publishers were going to continue to grow strongly, they would have to identify, pursue and capture value from opportunities beyond the traditional library budget
- Increasing focus on rankings and measurable research performance at all levels within the research intensive academic community, considering both research impact measured by citations, and the impact of research beyond researcher communities e.g. government, society and business
- The development of students acting as customers in HE, increasing the focus on student employability

The greatest change affecting publishers was the acceptance of OA as a dissemination opportunity, conflicting with the ongoing role of traditional, high citation impact factor journals as a way of assessing the quality of the output of researchers. OA had introduced different business models to the sector, challenging the dominant logic of the publisher subscription model.

4.2.3 Defining the core business of different publishers

Core markets were defined as HE institutions, i.e. universities, and the principal users were researchers, teachers, and postgraduate students. Core product ranges were academic journals, scholarly books, textbooks and case studies. The pre-eminent buyers were librarians, influenced by academics. In very hierarchical markets dominated by international ranking indices, success with the leading 100 universities globally was seen to lead to success in other research intensive universities.

Another core activity for publishers was securing contracts to publish the journals of prestigious societies, with the proceeds from sales being shared between the society and the publisher.

To grow in both core and beyond the core markets, the case organisations identified that they needed to have insights in the areas indicated in the figure below:

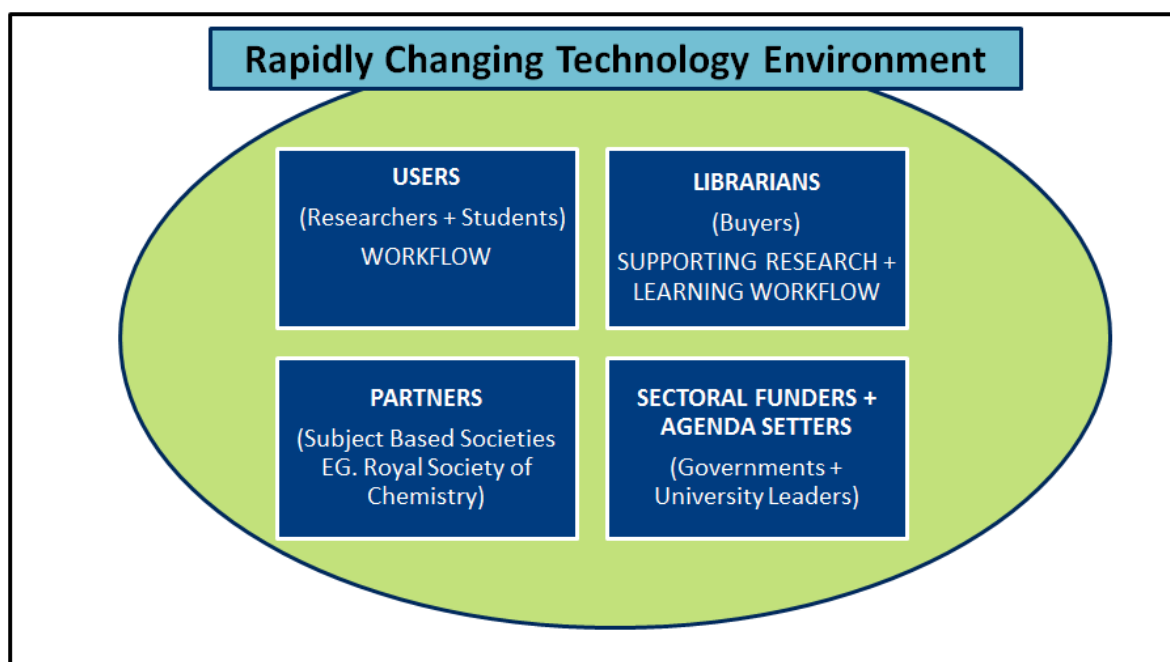


Figure 4.1. Critical stakeholders targeted through search activities

4.2.4 How publishers operated “beyond the core”

The literature review suggests that organisations need to be able to adapt to internal and external changes, and orchestrate and reconfigure their dynamic capabilities to compete successfully (Teece et al., 1997; Teece, 2007). More specifically, the literature suggests that organisations require the 11 capabilities that support the management of search and select in disrupting environments detailed in Table 4.1 to manage the search and select stages of the innovation process across core, adjacent and breakthrough environments.

Innovation Search and Select Capabilities in Core, Adjacent & Breakthrough Environments
Companies will manage search and select effectively if they:
1) Are guided by a high level, portfolio driven strategic plan supported by appropriate structures considering core, adjacent and breakthrough
2) Search the periphery for innovation and NPD opportunities (Breakthrough environments only)
3) Operationalise structured search and select processes across core, adjacent and breakthrough environments
4) Seek out and share deep contextual domain insights, e.g. macro social, industry and technology trends
5) Seek out and share deep domain insights into user workflows
6) Deploy digital era market research techniques e.g. netnography
7) Identify and validate "big enough" pervasive problems and jobs-to-be-done requiring solutions
8) Validate and iterate opportunities through MVP testing and learning
9) Recruit, connect with and learn from individuals outside the firm's core industry
10) Identify & validate external acquisition and investment opportunities
11) Act on strategic analysis, investing in, acquiring, and/or collaborating with external organisations

Table 4.1: Innovation Search and Select Capabilities in Core, Adjacent & Breakthrough Environments

As expected from the literature review, the research revealed that the case companies were engaged in a spectrum of activities, with their innovation projects ranging from targeting previously unserved users, e.g. undergraduates instead of academics and postgraduates, to opportunities further from the core such as video products and data informed workflow solutions for researchers.

4.4 Structuring the findings

The findings are structured under the following headings, to support the discussion chapters that follow:

- Large commercial publishers
- Medium sized commercial publishers
- University press publishers
- Scholarly society publishers

A summary of the findings from the 46 hours of interviews has been compiled for each of the ten case companies. Each case profile was structured under the core, adjacent and breakthrough headings used throughout the study. The findings were sequenced to support the researcher's assessment of the presence of the search and select capabilities of each case company, following the order shown in table 4.1 above.

4.5 Which questions generated the greatest volume of insightful comments?

Six questions in particular engaged the interviewees, once opening remarks, biographical information, and rich reflections on significant developments in the company and sector over the previous five years had been covered.

While the volume of data generated through the interview process by particular questions does not necessarily suggest that these were the most important questions in absolute terms, it is informative to reflect on the weight of comments that certain questions generated. The interviews had much more to say about the core business, than beyond the core (BTC).

Core: Which questions generated the greatest volume of insightful comment? Ranked in order of noteworthy comments	Researcher comments
13) In the core business, how does the organisation identify opportunities for innovation?	<p>All the interviewees had a lot to say about search in exploitation markets, as this was a regular and significant activity for each organisation. The reflections concerned strategic priorities, structure, technological change, and search activities including market research. The organisations with more limited exploration activities tended to be preoccupied by technology challenges and operational issues.</p> <p>The interviewees from organisations active BTC saw the identification of exploitation opportunities in the core as a demanding but routine process.</p>
14) What particularly influences the innovation and NPD process?	<p>The interviewees had almost as much to say about what influenced the innovation and NPD process, as they did about the search process itself. The organisations with more exploratory activities BTC were influenced by both the HE publishing industry and sectors outside the publishing industry.</p> <p>The interviewee's reflections also concerned strategic priorities, structure, technological change, and the challenge of seeking data to support decision making in novel areas of opportunity.</p>
15) What particularly influences which innovation projects are selected for further development?	<p>The interviewees had strong opinions about what influenced decision making, including mission, the strengths and weaknesses of the innovation process overall (structure), the priorities of the firm which were influenced by strategy, structure, organisational attention, cognition, and technology capabilities.</p>

Table 4.2: Core markets: Which questions generated the greatest volume of insightful comments?

The interviewees from the companies who were not engaged in exploratory activities beyond the core had less to say about what they were doing in adjacent and breakthrough environments. However they had much to say about why their organisations were not active beyond the core.

Beyond the core: Which questions generated the greatest volume of insightful comment? Ranked in order of noteworthy comments	Researcher comments
<p>18. How does the organisation operate beyond the core business? What makes it successful beyond the core business?</p>	<p>The interviewees from organisations with exploratory strategies and structures supporting activities beyond the core had a great deal to describe, particularly concerning user workflows. These organisations had separate, portfolio driven structures designed to support business BTC, which had been well communicated across the firm.</p> <p>The interviewees from less active organisations BTC reflected at length on why their organisations were more focused on exploitation activities focused on existing customers, keeping up with the industry technology race, and the demands of operational management challenges.</p> <p>The role of acquisition activity was a major theme.</p>
<p>22. What particularly influences the innovation and product development process beyond the core?</p>	<p>The informants active beyond the core pointed to trigger events that had confirmed their organisation's commitment to operate BTC.</p> <p>The interviewees from the organisations with more activities beyond the core were confident about managing technology in the core, enabling them to focus BTC. Activities to identify pervasive problems, supported by persuasive facts, were highlighted by those exploring BTC.</p> <p>The interviewees active BTC commented on the need for an articulated strategy, strong technology, structure and processes, supported by senior team backing, to enable exploration activities BTC.</p> <p>Activities in breakthrough/peripheral environments needed special understanding, and sometimes boundary spanning structures</p>
<p>21. Beyond the core business, how does the organisation identify opportunities for innovation?</p>	<p>The interviewees from firms active BTC tended to look for jobs-to-be-done in the user workflow. While interviewees with significant core industry experience were ready to explore adjacencies, individuals working on breakthrough opportunities in the periphery tended to have strong technology backgrounds, and significant experience outside publishing.</p>

Table 4.3: Beyond the core markets: Which questions generated the greatest volume of insightful comments?

4.6 The detail within each case profile

Each case profile contains demographic data about the interviewees.

Each case profile also contains data summarizing the answers of the respondents to the following questions:

- Is it clear who is responsible for searching for innovation and NPD opportunities in the core business?
- Does the organisation have an effective knowledge management, or other system, to support innovation and NPD processes in the core business?
- Is it clear who is responsible for searching for innovation and NPD opportunities beyond the core business?
- Does the organisation have an effective knowledge management, or other system, to support innovation and NPD processes beyond the core business?
- Does the organisation have a systematic way of searching the periphery of the business environment for innovation and NPD opportunities?

4.7 Capability rating system

To draw meaning, and to enable comparisons, the cases were analysed using a simple capability rating system shown below, and explained in Chapter 3:

3	Capability well established, with consistent and clear references to ongoing activities
2	Capability present, with some references to ongoing activities
1	Capability partially/patchily present, with limited supporting references to ongoing activities
0	No supporting reference s regarding current activities

Table 4.4: Capability rating system

4.8 Findings summary table: Large commercial publishers

The summary table below brings together the main findings regarding how large commercial publishers manage the innovation search and select processes in core, adjacent, and breakthrough environments.

Innovation Search and Select Capabilities in Core, Adjacent & Breakthrough Environments	Case A Core	Case A Adjacent	Case A Breakthrough	Case B Core	Case B Adjacent	Case B Breakthrough	Case C Core	Case C Adjacent	Case C Breakthrough	Case D Core	Case D Adjacent	Case D Breakthrough
What Does A HE Publisher Need To Be Able To Do?												
1) Guided by high level strategic plan considering Core, Adjacent and Breakthrough	3	2	2	3	3	3	3	1	0	3	3	3
2) Search the periphery for NPD opportunities	N/A	N/A	1	N/A	N/A	3	N/A	N/A	1	N/A	N/A	3
3) Operationalise structured Search & Select processes across Core, Adjacent and Breakthrough opportunities	3	2	1	3	3	3	3	1	0	3	3	3
4) Seek out and share deep contextual domain insights, e.g. macro social and technology trends	3	3	1	3	3	3	3	3	2	3	3	3
5) Seek out & share deep domain insights into user workflows	3	3	1	3	3	3	2	1	0	3	3	3
6) Deploy digital era market research techniques (e.g. netnography)	3	3	0	3	3	3	1	1	0	3	3	3
7) Identify and validate "big enough" pervasive problems requiring solutions	3	3	1	3	3	3	3	1	0	3	3	3
8) Validate and iterate opportunities through MVP testing & learning	3	2	0	3	3	3	2	1	0	3	3	3
9) Recruit, connect with & learn from individuals outside core industry	1	2	0	3	3	3	1	2	0	2	2	3
10) Identify & validate external acquisition & investment opportunities	3	3	1	3	3	3	3	1	0	3	3	3
11) Act on analysis, investing in, acquiring, and/or collaborating with external organisations	3	3	1	3	3	3	3	2	0	3	3	3
	28	26	9	30	30	33	24	14	3	29	29	33

Table 4.5: How large commercial publishers manage the innovation search and select processes in core, adjacent, and breakthrough environments

4.9 Case A: Large commercial publisher

4.9.1 Background on the company and the interviewees

Case A had many years of successful innovation selection to look back on. Their portfolio was central to HE stakeholders across the STM and HASS subjects globally, and content delivery platform met the demands of researchers and wider users.

The overall organisation had worldwide revenues of over £1bn, with excellent margins. The firm had a major market share in the global STM journals market, publishing over 2,000 journals (Ware & Mabe, 2015 pp. 45).

The company had grown strongly over the last ten years, particularly through acquiring other publishers who supplied content to the same core markets as Case A. The firm had also managed to secure strong price increases with HE library customers in the past. The HE library market was seen as not growing as strongly as before: “The major influences externally were the recognition that the core market for our products in global research i.e. libraries, were severely constrained in terms of growth opportunities so we needed to innovate around journal publishing.” The impact of slower growth in previously strong markets was that: “When growth of the core business is moving at a rate that is inconsistent or sub-optimal compared to our expectations, it is a huge driver of innovation.”

The seven interviewees had, on average, been with Case A for 17.9 years, as compared to the average length of employment with the same publisher of 10.3 years across the whole sample, and was the longest of any of the cases. They were also highly experienced, having averaged 21.3 years in publishing. Four of the interviewees were interviewed face to face, and three of the interviews took place using Skype with staff based in the US.

The organisation kept up with technology developments in core markets. The technology budget prioritised journal focused projects: “So the books teams now go outside for technology solutions.” It had strengths in the area of educational technology.

4.9.2 Comments on the core business

The overall capability rating regarding core markets was 28 out of 30.

Case A was moving from a subject (content) driven structure to a solutions structure, with a strong focus on market sizing. The firm ran a three year rolling strategic plan, with more detailed annual plans, and was very “numbers driven”. An interviewee explained: “People want to be able to see a number, describe what that number is going to deliver and describe what the return on investment was going to be and then to be able to monitor that through the year to say that in fact we spent the money and this is the return on investment that we got, which is quite structured and quite sensible, but on the other hand (this approach) doesn’t lend itself very well to a more agile or nimble approach to product development.”

The annual planning cycle: “Effectively harvests ideas from the various business groups about what they think needs to happen in the next year that we would then put into the context of a strategic plan where we go out and we look at the major market trends, the market environment, the opportunities and the risks that that might throw up and then we compare what we think all of that means so that we can then identify the things that need to happen in the next twelve months.”

In terms of books: “We are still rather stuck in the old paradigm of printed books and their facsimiles online. I don’t think we have really gone very far beyond that.”

It was not clear who was responsible for searching for innovation and NPD opportunities in the core business, as shown below.

Is it clear who is responsible for searching for innovation and NPD opportunities in the core business?		
Yes: 3	No: 2	Question not asked: 2

External relationships are in place with scholarly societies, researchers, academic institutions and libraries. The organisation had gained new business in the association and society publishing arena. Case A also had connections in place with the educational

technology and learning assessment communities.

The organisation analysed usage data, but focused more on existing services rather than the wider research workflow. They identified user personas, using ethnography to understand the days of key stakeholders, but financial constraints limited the use of ethnography. The education (textbook) part of the business was experienced in using learning workflows to guide the portfolio, and so the lines between core & adjacent were less clear: “That kind of philosophy has been with us for the last decade really at least.”

The firm was looking to identify pervasive problems: “The pervasiveness of the problem that the innovation is looking to solve is a big predictor (of project approval).”

The firm deployed MVP approaches: “Our technology team to come up with wire frames, and test a minimal viable product to see whether or not there’s a market acceptance.” The organisation sometimes found it difficult to align innovation projects and technology delivery: “Innovation planning & technology planning cycles do not work well together. (The) ROI (return on investment) centred culture is struggling with the demands of more agile NPD approaches.”

Case A was active in the identification of acquisition targets, and was experienced in buying and integrating content within its core businesses. They collaborated with emergent software companies. An interviewee observed that: “There’s more that becomes core business”, particularly as products for core markets became more technology enabled and solution focused.

The organisation did not have effective knowledge management systems to support innovation activities in the core business.

Does the organisation have an effective knowledge management, or other system, to support innovation and NPD processes in the core business?		
Yes: 0	No: 5	Question not asked: 0

4.9.3 Findings regarding adjacent market environments

The overall capability rating regarding adjacent markets was 26 out of 30.

Case A was moving from a subject (content) structure to a solutions structure, with a focus on market sizing. Strategic fit and strategic alignment was a big strategic driver, with the company favouring a greater strategic focus on adjacent opportunities. The focus on adjacent opportunities looked to identify opportunities through deep partnerships with scholarly societies. There was a business group focused on OA.

The company had no clear or highly visible strategy map, strategy communication matrix or structure considering core, adjacent and breakthrough opportunities. They consciously avoided opportunities beyond the core and adjacent areas, except through acquisition.

The company had created a structured process, including a new market insights team, in the last 12 months. They have also set up dedicated innovation groups to focus on opportunities stemming from researcher activities and their work flow. A stage-gate process is: “A new approach that’s been developed in (one division) in the last 12-18 months.”

The interest in the process of innovation management had increased, with the stimulus for this coming from beyond the core, and through a division specifically charged with innovating beyond the core established in the last 12-15 months. “We’ve had strategic market analysis colleagues and market research colleagues going out there looking at the market, sizing the opportunity, identifying the spots within that market so that we can then say of all the opportunities these are the top five that we think are viable.”

There was a strong focus on external relationships, particularly emphasising scholarly societies, researchers, academic institutions and libraries, with connections with scholarly societies seen as the most important external relationships. Case A was well connected in to the educational technology and learning assessment communities, but lower emphasis was given to funders than some other major publishers. Connections were strong with core, and “near adjacent” communities.

There was a strong focus on user behaviour. The company listened to customers, created product road maps and then tried to socialise those product road maps to establish if communities/user groups seek the same solutions. They were moving from ad hoc observations to a more “user work flow/ life cycle based” approach, but this was emergent. Electronic product development staff identify personas, and use ethnography to understand the days of key stakeholders, but financial constraints limited ethnography. Consultants had been used to watch video of users in action.

Case A took a problem based approach to innovation, identifying professional challenges that users were experiencing or professional challenges that buyers were experiencing in both the library market and the corporate markets. An interviewee stated: “Pervasive problems that exist within certain segments of the market fuel our thinking around the innovation process”, adding: “Pervasiveness of identified problems within the market is a big area of focus for us.” There were repeated references to seeking to identify recurrent problems and to considering: “OK, these are recurring problems, and we can find a scalable solution.” The interviews revealed a strong focus on scenario planning.

In a highly numbers driven organisation, there was a strong emphasis on validation: “My department has the nickname “the department of facts””. Case A used prototype testing and direct feedback aggressively: “We come up with wire frames and test a minimal viable product to see whether or not there’s a market acceptance That’s been a big part of the shift of thinking.”

The interviews revealed that the organisation was well prepared to manage the innovation search and select processes considering adjacent markets. The research found that in six out of the ten key areas the capabilities was well established, with consistent and clear references to ongoing activities.

The organisation found dealing with failure problematic: “The culture at (the organisation) has been such that it was difficult to even publicly acknowledge failure where it happened, and therefore as an organisation we stood very little chance of learning from the mistakes where they happened.” Another interviewee said: “The organisation needs

to get better at embracing smart failure and it certainly uses the language of embracing smart failure but actually we are not very good at it, and I think we need to have some failures.”

The organisation had acquired different types of organisation considered adjacent to the traditional value chain. They had invested in companies providing educational services: “We are much more heavily invested outside that core of content and solutions than before.” An interviewee explained: “We now are in the realm of student recruitment, retention services, academic services, course development, that kind of thing and then on the other end of the spectrum, taking people through to employability. So we are creating programmes that help deliver employable job ready students.”

Case A had a long track record of acquiring companies in the core business at the right price, with highly developed integration skills. The culture of the organisation was comfortable with assessing, buying and integrating acquisitions. The acquisition of content companies in the core business had been the main area of focus. Acquisitions in the more adjacent educational technology and education process management areas were building new capabilities.

Strategic market analysis had been established in the previous 12-15 months, focusing on the effective validation of opportunities. However, the innovation processes were relatively new, and had only been established in one division. The management approach to the ideation and selection process was still relatively new.

Due to the exploration of breakthrough opportunities having not identified projects of interest to the company, there was an increased focus on adjacent, and implicitly “easier to exploit” opportunities.

It was not clear who was responsible for searching for innovation and NPD opportunities beyond the core business, as shown below.

Is it clear who is responsible for searching for innovation and NPD opportunities beyond the core business?

Yes: 2

No: 2

Question not asked: 3

The organisation did not have effective knowledge management systems to support innovation activities in the core business. The adjacent market focused innovation division scored better here, with a commitment across the division to knowledge management.

Does the organisation have an effective knowledge management, or other system, to support innovation and NPD processes beyond the core business?

Yes: 4

No: 3

Question not asked: 0

4.9.4 Findings regarding breakthrough market environments

The overall capability rating regarding breakthrough environments was 9 out of 33.

Case A consciously avoided opportunities beyond the core and adjacent areas, except through acquisition. The organisation did not appear to pursue breakthrough opportunities, having scoped the research workflow space, and saw this as a “nascent” but sub-scale opportunity. There was little mention of searching more distant environments for breakthrough opportunities, apart from a limited exploration of opportunities in the research workflow space.

The organisation was not as prepared to explore breakthrough environments as it was to explore adjacent opportunities, with none of the 11 NPD search or select capabilities identified through the literature review being evaluated at more than “Capability partially/patchily present, with limited supporting references to ongoing activities.” There was no sign through the interviews of the deployment of up to date market research techniques, or MVP testing to evaluate opportunities beyond adjacent markets.

When the organisation recognised that it needed to grow in the more uncertain sectors beyond the core, staff and departments explored opportunities in both adjacent and breakthrough sectors. This initial burst of activity beyond the core empowered significant exploration, including looking for technology based workflow solutions. The company’s disciplined market sizing approach did not identify any opportunities of sufficient size in breakthrough (transformational) environments. Only three out of seven respondents felt that the organisation had a systematic way of searching the periphery of the business environment for innovation and NPD opportunities.

Does the organisation have a systematic way of searching the periphery of your business environment for innovation and NPD opportunities?		
Yes: 3	No: 4	Question not asked: 0

The interviews revealed more attention being given to the periphery to try to identify risks, rather than to recognise opportunities.

4.9.5 Knowledge acquisition

Case A was an “outside in” (Day & Moorman, 2010) organisation, deeply connected with its customers and wider stakeholder communities. The company had repeatedly used the acquisition of companies to bring in new knowledge relevant to “new to the organisation” sectors.

4.10 Case B: Large commercial publisher

4.10.1 Background on the company and the interviewees

The organisation was very successful in its core business, with significant market share. Global company revenues were in excess of £1bn, with strong margins. The organisation supplied content (e.g. books, journals, databases) and productivity tools to government, academic and corporate markets. The firm had a major market share in the global STM journals market, publishing over 2,000 journals (Ware & Mabe, 2015 pp. 45).

The three interviewees had, on average, been with Case B for 2.2 years, as compared to the sample's average time with the same publisher of 10.3 years. They averaged 5.2 years in publishing.

4.10.2 Comments on the core business

The overall capability rating regarding core markets was 30 out of 30, with Case B having well established capabilities across the ten search and select priority processes.

There was clear recognition of three “zones of opportunity”, in core, adjacent and breakthrough environments. Success in the core business was seen as being about: “Can we get the right digital people whether that be software development or art or design. So there's a big shift.”

Case B took a workflow solution approach to product development, working to solve problems both in the core and adjacent markets with an integrated approach: “We've got this core content base, and how do we embed ourselves in our customer's work flow, to make their workflow better and easier and more efficient, so we can provide services that go with that content to make it more accessible to them.”

The organisation was moving from a content and library focus to a user driven focus, with an interviewee explaining the: “Change from a content based business to a more service orientated business.” The organisation took a very technology centric approach to NPD, and backed this up with increased technology resources: “We’ve added probably 10, 15, 20% year-on-year for the last few years to the technology side.”

Product development appeared to be well structured, managed by Product Directors who worked in a particular market space. Beneath them there were a series of Product Managers who were: “Looking at both existing competitors and also what you might call new competitors. We do a lot of work with our partners in academic and research institutions to help them articulate their needs.”

Case B deployed lean product development approaches, with a strong focus on concept and prototype validation: “It’s all about how we validate opportunities quickly and efficiently, and do not spend a huge amount of money developing something that we’re going to throw away. We do a lot of work around concept research, getting a small set of customers together as a focus group, and giving them a prototype for something we’re looking at.” MVPs were used widely: “We do a lot of throwaway work, which is something that certainly has accelerated dramatically over the last two or three years.” The NPD approach was data driven, with the project teams building: “A spine of data” that they could use to develop and test their prototypes.

The company was very user focused: “We are building a new technology building to put a new technology base in, and part of that is we’re actually allocating space for user testing labs. We’ll put the users into a room, with a prototype, with a viewing centre on the side, and we actually watch them, how they use the product, how they work with the prototype.” The NPD process considered: “What’s going to improve the amount of time, the amount of effort, and the amount of time, the user spends with a product.” Success in solving user problems: “Equates to more pressure on the institution to continue to purchase that product, and purchase more of our products.”

The firm was conscious of the need to avoid the challenges of being a big organisation: “We’re trying to move that traditional innovation part of our work to something that’s much more start-up focused. When you’re a big company, it’s very easy to get slow and to be old fashioned, but we’re trying to make sure that we don’t kind of throw away that tradition and that huge benefit that we’ve got from that, but we bring in a lot of this kind of new intuitive way of looking at things.”

Case B watched its competitors closely, as it understood that technical prowess was key in securing the publishing business of the associations.

While it was a small sample, responsibility for product development in the core business was reasonably clear, as is shown below.

Is it clear who is responsible for searching for innovation and NPD opportunities in the core business?		
Yes: 2	No: 1	Question not asked: 2

The suggestion below was that Case B had effective knowledge management systems to support innovation activities in the core business, but there was only one respondent to this question.

Does the organisation have an effective knowledge management, or other system, to support innovation and NPD processes in the core business?		
Yes: 1	No: 0	Question not asked: 2

4.10.3 Findings regarding adjacent market environments

The overall capability rating regarding adjacent markets was 30 out of 30, with Case B having well established capabilities across the ten search and select priority processes.

There was clear recognition of three “zones of opportunity”, in core, adjacent and breakthrough environments. The organisation consciously managed core and adjacent markets together: “The day to day innovation for core and adjacent is done by the product teams and the local teams within the business units and then when we get into that kind of wider area where it’s a little bit more ... I guess a little bit less focused in terms of what it’s going to deliver, it gets pushed out to a separate group.” An interviewee explained that: “There’s a very blurred line between core and non-core (core & adjacent).”

Proactive, extensive and structured search and selection processes were in place in adjacent environments. The following quotes emphasise the integrated approach being taken to core and adjacent markets: “It’s difficult to know where beyond the core starts and finishes;” “There’s a lot of work going, particularly on the product side now looking at kind of adjacent markets or adjacent fields;” and: “Greater tech focus blurs lines.” Case B looked to other parts of the business, seeking out lessons that could be learned: “There’s a lot of work going on within (the organisation) to look at the other parts of (the organisation) and what we can bring from those.”

The organisation was deeply connected with the funders, policy makers, organisational leaders, change advocates, thought leaders and technologists influencing adjacent markets. The organisation sought out and responded to deep domain insights into user workflows and “jobs-to-be-done”. There was: “A very deliberate attempt to move the focus of what we’re doing away from the institution, who pays the subscriptions for our content, to the end user. So it’s a user focus.”

The company was building facilities to observe user behaviour through inviting users to be observed using emerging MPV solutions. The company was data centric, looking to “prove” the value of MVPs. Agile development approaches were the norm. The firm was actively recruiting people from beyond the core industry in both managerial and technology roles.

Case B managed a range of investment opportunities. Less consideration was given to acquisition opportunities in adjacent areas, as the firm expected to be able to pursue these opportunities through leveraging their own resources

The respondents felt that it was reasonably clear who was responsible for searching for innovation and NPD opportunities beyond the core business, as shown below. The responses to the question did not particularly reflect the highly structured approaches described by the interviewees.

Is it clear who is responsible for searching for innovation and NPD opportunities in the core business?

Yes: 2	No: 1	Question not asked: 0
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The organisation did not have particularly effective knowledge management systems to support innovation activities in the core business. However, there were only two respondents to this question.

Does the organisation have an effective knowledge management, or other system, to support innovation and NPD processes in the core business?

Yes: 1	No: 1	Question not asked: 1
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4.10.4 Findings regarding breakthrough market environments

The overall capability rating regarding breakthrough markets was 33 out of 33, with Case B revealing strong capabilities across the 11 search and select priority processes.

There was clear recognition of “three zones of opportunity”, in core, adjacent and breakthrough environments. Case B looked to other parts of the business, to look for lessons that could be learned: “There’s a lot of work going on within (the organisation) to look at the other parts of (the organisation) and what we can bring from those.”

As in adjacent markets, the company was building facilities to observe user behaviour through inviting users to be observed using emerging MVP solutions. Data centricity was evident, with MVPs used widely as a part of an agile development approach.

Case B was actively recruiting people from beyond core industry in both managerial and technology roles. As a part of the probationary review at 6 months, new staff were asked: “What are your questions? What can we do better? What can we bring in? What have you seen elsewhere? What would you like to try?”

Proactive and structured search and selection processes were in place considering more peripheral environments. More peripheral opportunities were considered through central strategic group, as well as the work of peripheral environment focused acquisitions. Building on the “Greater tech focus blurs lines” approach, an interviewee explained: “We’ve got a group on high performance computing and large data, so it’s kind of bringing some of that (data analysis) in and innovating on that kind of platform.”

The company explored the “use of non-content”. In addition, interviewees explained the use of analogies from other sectors to build opportunities.

Case B’s problem based approach to innovation in the periphery strove to “create facts” through mock ups, outside core and adjacent markets: “There is a process whereby any new investment needs to be signed off by key stakeholders, but that’s not quite it. I don’t think you can get momentum, certainly behind the larger ones, unless you get this consensus, to build the excitement. I think the other thing which works is just creating

facts.” Another interviewee observed: “Technology people build “facts” in different ways ... The winner will be the person that actually creates the fact. And that sort of ‘let’s get on with it’ mentality is kind of disruptive.”

The company had acquired organisations beyond the core and adjacent areas, and was ready to invest in pure-play technology companies, not just content companies. Case B managed a portfolio of investment opportunities.

When considering opportunities in the periphery, the firm consciously assessed potential “problems to be solved” and abstracted away from the problems being considered to other sectors. They worked with external “cutting edge” technology organisations, and faster moving sectors. Case B constantly watched Google, Amazon, and Apple as well as start-ups for ideas.

Based on the interviews, the organisation had a systematic way of searching the periphery of the business environment for innovation and NPD opportunities. In answering a direct question on this, two out of three respondents felt that this was the case.

Does the organisation have a systematic way of searching the periphery of your business environment for innovation and NPD opportunities?		
Yes: 2	No: 1	Question not asked: 0

4.10.5 Knowledge acquisition

A structured approach to learn from new recruits to the organisation was in place to identify ideas that are working in other sectors, particularly considering technology issues. Case B was deeply connected with its customers and wider stakeholder communities. The company had repeatedly used the acquisition of companies to bring in new knowledge relevant to “new to the organisation” sectors.

There was significant investment and collaboration through exploiting internal resources, which were sometimes at a significant distance from the particular problem being worked on. Product managers explored at a distance from their own markets seeking ideas and opportunities: “It’s about what solves the problem most efficiently and whether that’s internal or external factors or ideas does not really matter to us.”

Case B had recruited user focused staff from major Californian based organisations at senior levels. A major knowledge development focus was in looking for patterns in wider researcher activities, supporting the explicit strategy to move the NPD focus from the institution to the user.

4.11 Case C: Large commercial publisher

Case C was a major publisher of books and journals, operating within a larger organisation with global revenues exceeding £1bn. The publishing business had grown strongly (typically over 10% p.a.) over recent years, with a significant proportion of growth achieved through the effective acquisition and integration of other publishers. Acquisitions had been of high quality content, and had typically strengthened the offering to the core academic library market, rather than moving the organisation into adjacent or breakthrough markets.

The firm had a major market share in the global STM journals market, publishing over 2,000 journals (Ware & Mabe, 2015, p. 45).

4.11.1 Background on the company and the interviewees

The interviewees had, on average, been with Case C for 10.5 years, as compared to the average time with the same publisher of 10.3 years.

The interviewees had spent an average of 21.8 years in publishing, the longest of any of the case companies, while the overall sample had spent an average of 17 years in publishing.

4.11.2 Comments on the core business

The overall capability rating regarding core markets was 24 out of 30.

There was no clear or highly visible strategy or structure considering core, adjacent and breakthrough opportunities, and Case C had adopted more of a “wait and see” approach to adjacent and breakthrough environments. The development of the product offering had been driven through acquiring additional content targeted at the core market: “In terms of developing the portfolio here it has been about acquisition. So it's been very much about bringing more and more stuff in and merging it in to the systems and the processes that (the company) has.”

Case C was structured around subject areas, with a product planning process covering the development of plans for all journals covering the next three years. Well established project management routines were in place. The company had a major focus on winning the business of the societies.

The company was very well connected to industry bodies and industry initiatives, with an increased focus on funders in the last three years. The firm had close connections to scholarly societies. The firm analysed content downloads, but had no real focus on user workflow. User understanding was more driven by involvement in industry initiatives, rather than company initiatives. The company used surveys, advisory boards and focus groups extensively, as well as watching social media. The firm was considering greater use of digital assessment tools, but there had been little follow through.

During the interviews there were few indications of recruiting individuals who were not highly experienced in the core business, apart from the adjacent OA division.

Customer driven pervasive problems in the core business did get prioritized, but the problems given priority tended to be connected to the delivery of content, and solving problems for customers and society partners. Beyond OA initiatives, and one development project, there was no reference to efforts to identify new problems that the company could address commercially. Case C looked to industry initiatives to identify major trends.

The interviewees referred to some limited examples of piloting new developments to gauge reaction and assess usage of different elements of emerging products. The firm was ready to pilot new technologies developed by outside companies.

The company was experienced in identifying acquisition targets, buying in content which it then integrated into existing processes and sales channels.

Case C worked with some start-ups and new technology providers on pilots. However, the major technology focus was on incrementalism, with one interviewee saying: “We do have quite complicated systems, so when things are suggested which are totally unrelated to what we do at the moment, people are actually putting their fingers in their ears because they are thinking ‘you’re saying I’ve got to redesign every single element that we use day-to-day, week-to-week and that’s so much work.’”

While it was a small sample, responsibility for product development in the core business was not particularly clear. Overall, the editorial department with responsibility for content development was felt to have the greatest influence.

Is it clear who is responsible for searching for innovation and NPD opportunities in the core business?		
Yes: 3	No: 2	Question not asked: 0

The organisation did not have effective knowledge management systems to support innovation activities in the core business.

Does the organisation have an effective knowledge management, or other system, to support innovation and NPD processes in the core business?		
Yes: 2	No: 3	Question not asked: 0

4.11.3 Findings regarding adjacent market environments

The overall capability rating regarding adjacent markets was 14 out of 30.

There was no clear or highly visible strategy or structure considering adjacent opportunities. Activities were focused by subject and/or geographic priorities, and acquisition priorities in particular: “The innovation side of development takes second place to the project work around acquisition, so large acquisitions have quite an impact on our ability to take forward new projects.” There was a strong organisational focus on incremental, process focused innovation. Case C consciously avoided opportunities beyond the core, apart from OA and archive related projects: “We’re quite conservative. We like the core business..... There are certainly opportunities that come up that are outside the core business, but people get very uncomfortable very quickly.”

There was no joined up approach to product development considering adjacent markets, as the development of the product offering had been driven through acquiring additional content targeted at the core market. Apart from recent OA initiatives, there had only been very limited NPD activities beyond the core market. One particular adjacent market initiative was mentioned a number of times, and one interviewee commented: “I don't think we've done too much beyond the core business yet.”

The interviewees did not feel that it was clear who was responsible for searching for innovation and NPD opportunities beyond the core business, as shown below.

Is it clear who is responsible for searching for innovation and NPD opportunities beyond the core business?		
Yes: 1	No: 3	Question not asked: 1

Case C was very well connected to industry bodies and industry initiatives. There had been an increased focus on funders in the last three years. There was a limited focus on budgets beyond the traditional library budget, and scholarly societies.

The firm had no real focus on user workflow, apart from the OA division's activities to understand the motivations of researchers at a more "consumer" level. The OA division had moved away from being very B2B focused, and was relatively user and researcher driven. User understanding came more from involvement in industry initiatives, rather than company initiatives.

The company engaged in discussions on industry trends and opportunities through social media, and assessed competitor offerings. While there were extensive surveys run in core markets, there was little activity focused on adjacent markets. Case C was considering greater use of digital assessment tools, but there was little follow through.

Beyond OA (new business model) initiatives, and one development project, there was no reference to efforts to identify new problems that the company could address commercially in adjacent markets. There were some emerging examples of the piloting of new developments to gauge reaction and assess usage of different elements of new services developed by the OA division.

The development of the OA offer had triggered the recruitment of some "non-core market" staff.

Connections were strong with the core market, but not strong beyond the customers and suppliers connected with core markets.

There was a long and highly successful track record of acquiring companies in the core business at the right price, with very well developed integration skills. The culture of the organisation was comfortable with assessing, buying and integrating acquisitions. While the acquisition of content companies in the core business had been the main area of focus for the company in recent years, there was no appetite for identifying acquisition targets beyond the core market, apart from OA initiatives

Case C collaborated with some start-up organisations to explore new technical opportunities related to OA activities and new business models.

No interviewees saw the organisation as having effective knowledge management systems to support innovation activities beyond the core business.

Does the organisation have an effective knowledge management, or other system, to support innovation and NPD processes beyond the core business?

Yes: 0

No: 4

Question not asked: 1

4.11.4 Findings regarding breakthrough market environments

The overall capability rating regarding breakthrough markets was 3 out of 33, with Case C demonstrating weak capabilities across the 11 search and select capabilities.

Case C did not have a clear or highly visible strategy or structure considering breakthrough opportunities. The company's strong past growth had been driven by content acquisition and integration in the core market, and there had not been the need to look beyond the core market for financial growth up until recently. The strong growth in the core had demanded a strong organisational focus on incremental, process focused innovation, with new business models being taken forward by the OA division.

There were no activities identified targeting breakthrough opportunities, or the understanding of users in breakthrough environments. The interviewees did not discuss how the firm look for pervasive problems in breakthrough environments, or the pursuit of acquisition opportunities beyond the core. As quoted before: "We're quite conservative. We like the core business..... There are certainly opportunities that come up that are outside the core business, but people get very uncomfortable very quickly."

Based on the interviews, the organisation did not have a systematic way of searching the periphery of the business environment for innovation and NPD opportunities, supported by the data below.

Does the organisation have a systematic way of searching the periphery of your business environment for innovation and NPD opportunities?		
Yes: 0	No: 4	Question not asked: 1

4.11.5 Knowledge acquisition

Case C was well connected to the main stakeholder groups, particularly through trade association working groups and events. A senior expert in OA models had been recruited to lead their OA activities.

4.12 Case D: Large commercial publisher

Case D was a major publisher of journals, books and textbooks, with revenues exceeding £1bn. Market share was high, and margins were strong. The company was confident with technology, and was particularly well connected to academia, with a relatively high proportion of staff acquiring a PhD before joining the firm.

The core business had a reputation for publishing high quality journals, delivered through industry leading digital platforms. The publisher had a particular focus on STM subject areas.

4.12.1 Background on the company and the interviewees

The interviewees had, on average, been with Case D for 10.8 years, as compared to the sample average time with the same publisher of 10.3 years. While the overall sample had spent an average of 17 years in publishing, the interviewees had spent an average of 11.2 years in the industry.

4.12.2 Comments on the core business

The overall capability rating regarding core markets was 29 out of 30.

Case D had a very clearly structured approach to all business activities considering core, adjacent and breakthrough opportunities on a colour coded basis, and this structure was referred to in all interviews. The structured approach across the core business, supported by management training from a leading innovation scholar, gave individuals and managers freedom to explore their multiple environments as they needed to. Responsibilities were felt to be clear, as shown below.

Is it clear who is responsible for searching for innovation and NPD opportunities in the core business?		
Yes: 4	No: 0	Question not asked: 1

The company was deeply connected with researchers, university administrators, and funders to understand their workflow and problems-to-be-solved. The organisation was very data orientated, and used a wide variety of techniques to understand the needs of users, and researchers in particular.

Case D took a technology and problem based approach to product development, with a major focus on data collection and data analysis, to identify “facts” and recurring challenges. The company focused on users, as well as the needs of B2B DMUs.

The organisation deployed product development techniques, using MPVs to gauge user reaction. Due to the high focus on technology, the company recruited large numbers of technical staff from beyond the industry. There was a relatively high preponderance of content focused staff in the core business, with long experience of the industry.

The organisation did not have effective knowledge management systems to support innovation activities in the core business, as shown below.

Does the organisation have an effective knowledge management, or other system, to support innovation and NPD processes in the core business?		
Yes: 1	No: 3	Question not asked: 1

4.12.3 Findings regarding adjacent market environments

The overall capability rating regarding adjacent market environments was 29 out of 30.

The company had a clearly structured approach to business activities considering adjacent markets, using a colour coded matrix referred to in all interviews. The company saw OA activities as lying in adjacent markets to the core. The clearly structured approach supported the adjacent division in working with both core and breakthrough divisions. The approach of the company was illuminated by the quote: “If you are going to be in the information business, and we live in the information age, and the information technology driven age, you need to get really good with information technology, which means software and data, and so that sort of redefines what it means to be a publisher in terms of information in terms of information technology.” Search and select activities were operationalised in adjacent markets. Responsibilities were clear to four out of five of the interviewees, as shown in the table below.

Is it clear who is responsible for searching for innovation and NPD opportunities beyond the core business?		
Yes: 4	No: 1	Question not asked: 0

Staff in the adjacent division connected with researchers, university administrators, and funders, helping them to understand the way they worked, and what they were looking for.

The company was focused on solving problems in the workflow of their stakeholders. An interviewee explained: “It’s all about making sure we understand the need and deliver the need. What else is important?” They continued: “Products need to be solving a problem within the workflow, so we do very detailed workflow analysis.” Staff worked across the organisation, including on technology issues. Workflow solutions were seen as critical, as they extended the space that the organisation operated in: “It is about understanding and building things that directly address a need for our community. I think a lot of people say that, but I do genuinely think that we have started to live that (approach) very strongly.”

Case D understood user needs in adjacent environments, through calls, visits, and on the ground market research. They used ethnography within the search and select process, sitting with researchers throughout their day to identify jobs-to-be-done.

To identify pervasive problems, staff identified the questions that stakeholders were asking, listening to repeated questions. They identified recurring challenges through: “Being able to focus on the same market but from multiple perspectives, building up reliability and trust.”

The organisation made extensive use of short pilots and MVPs. They were rigorous with trials, as they were highly focused on data capture to understand user behaviour: “Fail fast is good, fail fast enough is probably where (the organisation) is.”

Case D sought to recruit extremely bright staff from academia, including a high proportion of PhDs. The high emphasis placed on technology, and importance of technology skills, supported the recruitment of many staff with experience beyond publishing in the adjacent and breakthrough divisions. The company sought staff strong in the deployment of technology from outside the core industry. The company sought investment opportunities, and was ready to invest in, and/or collaborate with external organisations.

The organisation had effective knowledge management systems to support innovation activities beyond the core.

Does the organisation have an effective knowledge management, or other system, to support innovation and NPD processes beyond the core business?

Yes: 4	No: 1	Question not asked: 0
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4.12.4 Findings regarding breakthrough market environments

The overall capability rating regarding breakthrough markets was 33 out of 33, with Case D having well established capabilities across the 11 key search and select capabilities.

An informant described the aim of the “breakthrough” division as being “disruptive innovation”. The clear strategic approach dividing the firm’s activities into three colour coded divisions empowered staff to explore the breakthrough opportunities that they were responsible for. There was a major focus beyond content based services.

The organisation was widely connected with stakeholders in the research space. These contacts were used to explore the periphery. Strong connections existed with technology driven organisations in California, through the background of employees. Staff drew parallels and learning from “analogous” sectors. Through their profile and connections in the research community, start-ups and entrepreneurs contacted the organisation with new ideas, which supported peripheral vision.

Three out of the five interviewees (see table below) felt that the organisation had a systematic way of searching the periphery of your business environment for innovation and NPD opportunities, as shown below.

Does the organisation have a systematic way of searching the periphery of your business environment for innovation and NPD opportunities?

Yes: 3	No: 2	Question not asked: 0
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Search and select activities were proactively managed in breakthrough areas. Certain staff were acknowledged experts on the development of HE research. Through engagement with the research community, staff could articulate a vision of how the organisation could support and enable science in the future. Many individuals had previously worked for customers, but had then joined the firm. The group worked with funders and governments, keeping the organisation connected with the changing research landscape, and looking at challenges for workflow: “Publishers are now starting to feel more comfortable to step outside the content focus and think of themselves as information providers, and also information solution providers.”

The division focused on understanding user and stakeholder behaviour, using data analysis and extensive networks in particular to understand stakeholder needs. Workflow solutions were critical, to extend the space that the organisation operated in. The group looked to solve wider research problems, providing a range of tools across different niches within the research workflow. Staff behaved as a part of the research ecosystem, and supported it positively.

In breakthrough environments the firm mixed progressive, data driven analysis with close working relationships with stakeholders, supported by punishing travel schedules, to understand user needs, and who managed budgets through calls, visits, on the ground market research. The market research was very data centric, using workflow information from the organisation’s digital solutions.

The breakthrough division used multiple methods, to validate the size and opportunities presented by pervasive problems. Links with the funders of research, and leaders within research universities, supported the search for new solution and revenue opportunities. A key organisational skill was the matching of appropriate business models to the new solutions developed to solve new problems.

The company used agile development processes and MPVs as an integral part of the solution development and validation process: “One of the important things to us is not just that we have lots of products to generate revenue, and that they are used by lots of users, but that we gather lots of useful or potentially useful information from them that we can then serve up in helpful ways.”

The division built technology based solutions, bringing in non-core industry staff to support and guide the development of opportunities. Newly recruited technology staff brought in extensive experience from other business sectors. As the aim of the division was to solve problems on the edge of the research ecosystem, the staff recruited tended not to have long experience in the core markets.

The company worked closely with start-ups, investing in them, and providing mentorship, particularly with the development of business models. They had found that the development of new ideas and solutions within the division, by salaried staff, was not successful in developing a range of solutions to support researchers, research institutions (university, government or commercially run), publishers and funders. Through investing in a portfolio of businesses, they developed tools to support users at different points in the research cycle.

Despite having developed an operating approach connected with the edges of research and publishing environments, two of the five interviewees did not feel that the organisation had a systematic way of searching the periphery of your business environment for innovation and NPD opportunities.

Does the organisation have a systematic way of searching the periphery of your business environment for innovation and NPD opportunities?		
Yes: 3	No: 2	Question not asked: 0

4.12.5 Knowledge acquisition

Due to its high focus on technological leadership, the firm benefited from the recruitment of technologists with experience of other sectors. Staff had been recruited into the breakthrough division with limited knowledge of publishing, but with significant knowledge of the environments that they were targeting. Strong links were maintained with start-ups in the US. Across the portfolio, staff were deeply connected with their external stakeholders. As an investor in start-ups, the firm benefited from the strong stakeholder networks of the leaders and staff of the incubation companies that they invested in across a range of researcher focused activities.

4.13 Findings summary: Medium sized commercial publishers

Table 4.6 below summarises the main findings from two medium sized commercial publishers, concerning how they manage the innovation search and select processes in core, adjacent, and breakthrough environments.

Innovation Search and Select Capabilities in Core, Adjacent & Breakthrough Environments	Case E Core	Case E Adjacent	Case E Break-through	Case F Core	Case F Adj	Case F Break-through
What Does A HE Publisher Need To Be Able To Do?						
1) Guided by high level strategic plan considering Core, Adjacent and Breakthrough	3	3	2	2	1	0
2) Search the periphery for innovation & NPD opportunities	N/A	N/A	1	N/A	N/A	0
3) Operationalise structured Search & Select processes across Core, Adjacent and Breakthrough opportunities	3	3	1	2	1	0
4) Seek out and share deep contextual domain insights, e.g. macro social and technology trends	3	3	2	2	1	1
5) Seek out & share deep domain insights into user workflows	3	3	0	1	1	0
6) Deploy digital era market research techniques (e.g. netnography)	3	3	0	2	2	0
7) Identify and validate "big enough" pervasive problems requiring solutions	3	3	0	2	1	0
8) Validate and iterate opportunities through MVP testing & learning	2	1	0	2	1	0
9) Recruit, connect with & learn from individuals outside core industry	1	1	0	2	2	0
10) Identify & validate external acquisition & investment opportunities	3	3	0	3	3	0
11) Act on analysis, investing in, acquiring, and/or collaborating with external organisations	3	3	0	3	3	0
	27	26	6	21	16	1

Table 4.6: How medium sized commercial publishers manage the innovation search and select processes in core, adjacent, and breakthrough environments

4.14 Case E: Medium sized commercial publisher

4.14.1 Background on the company and the interviewees

The company was a major publisher of journals, books and textbooks, and was privately owned. The firm had grown strongly for well over 20 years through expanding the subject portfolio, and had been in business for around 50 years.

Case E had used the acquisition of content focused organisations to expand both its offering and financial turnover. They had initially focused on social science content, but later developed a strong STM collection as well. The core business had a reputation for high quality journals, delivered through industry competitive online platforms.

The interviewees had, on average, been with Case E for 17.3 years, as compared to the sample's average of 10.3 years. While the overall sample had spent an average of 17 years in publishing, the interviewees were the most experienced in terms of industry experience, having spent an average of 22.2 years in publishing.

4.14.2 Comments on the core business

The overall capability rating regarding core markets was 27 out of 30.

Case E had a very clear “six-box” matrix, which was mentioned in all the interviews, influencing all organisational activities, and the matrix was seen as an extremely useful and practical management tool. The six-box matrix supported working across core and adjacent opportunities. The matrix was developed following a strategic review: “We had dynamic growth from 2003 to 2011. By the end of that time we felt that this is no longer sufficient. We want to keep investing in the core businesses, as they are still growth businesses. But it is no longer a sufficient strategy for the business.” The company had taken a fast follower approach to building the business, with an interviewee commenting: “Fast follower is very deliberately our strategy”, adding: “As a fast follower, people worry that we slip into being a slow follower.”

The firm had structured search and select processes for the core business, managed on a global basis. The clear strategic approach empowered search and select activities in the core. Resource allocation and search and select objectives were made simpler through the clear strategic approach. The company had a strong stage-gate process. The clarity of responsibilities is reflected in the table below.

Is it clear who is responsible for searching for innovation and NPD opportunities in the core business?		
Yes: 6	No: 0	Question not asked: 0

The organisation was deeply connected with researchers, university administrators, and funders. They profiled competitors in detail. They worked with scholarly society partners to generate significant market insight. They matched the pace of innovation of the company to what they saw as the relatively conventional and cautious pace of change within some of their stakeholder communities.

Case E analysed user patterns in detail, but did not take an explicit workflow approach to understanding users. There was thorough deployment of usage analysis. The firm had a strong market research culture, and had confidence in their market research capabilities. They used multiple methods to validate opportunities, including advisory boards. There were examples of MVP testing and learning, but this was emergent.

Recruitment came from the industry. The organisation used an externally developed web platform, which limited opportunities to recruit technology orientated staff. The organisation considered that it had “good enough” knowledge management systems to support innovation activities in the core business.

Does the organisation have an effective knowledge management, or other system, to support innovation and NPD processes in the core business?		
Yes: 5	No: 1	Question not asked: 0

The company was proactive in identifying, buying and integrating companies in core markets.

4.14.3 Findings regarding adjacent market environments

The overall capability rating regarding adjacent market environments was 26 out of 30.

The clear “six box” matrix supported the search and select process considering adjacent opportunities. The organisation: “Has a structure, has resourcing, has a strategy that articulates what it is we are looking for and what we are not looking for, and the different routes to getting it.” Responsibilities in markets beyond the core were clear to six out of six of the interviewees, as shown in the table below.

Is it clear who is responsible for searching for innovation and NPD opportunities beyond the core business?		
Yes: 6	No: 0	Question not asked: 0

Case E was closely connected with researchers, and librarians. They profiled competitors in existing and new markets, and worked closely with scholarly societies to create market insight. They matched the pace of innovation of the company to what they saw as the relatively conventional and cautious pace of change within their stakeholder communities.

The firm made some use of data from users, including students, to develop new products. The organisation valued the input of the B2B DMU (the library) when considering new projects.

The organisation’s strong market research culture, and the trust that they had in their market research capabilities, supported the company’s relatively recent push into adjacent markets. Digital research techniques were being used to assess new products for “new to the company” categories.

Staff used their understanding of educational and research processes to enable the identification and validation of “pervasive problems” in adjacent product areas. Widespread recognition that innovation increases the risk of failure was evident, with a high level acceptance of the need to try things out, and the need to fail. There was little structured use of MVP approaches in adjacent markets.

Recruitment and networking appeared to be focused on the core publishing industry. The company identified and acquired companies in adjacent markets, and had collaborated extensively with external organisations to move innovation activities forward in areas outside the core sectors.

The organisation had knowledge management systems to support innovation activities beyond the core business.

Does the organisation have an effective knowledge management, or other system, to support innovation and NPD processes beyond the core business?		
Yes: 6	No: 0	Question not asked: 0

4.14.4 Findings regarding breakthrough market environments

The overall capability rating regarding breakthrough market environments was 5 out of 30. The “six box” matrix enabled the company to consider and “park” opportunities from the periphery, which senior executives had decided that they did not want to explore. The organisation’s strategic plan and management approach recognised opportunities in peripheral areas, but consciously did not pursue them.

The “six box” approach saved time, with “breakthrough” opportunities analysed quickly, and then removed as an ongoing distraction in this fast follower firm. Through their deep connections with senior players in HE, Case E could decide what they saw as an adjacent opportunity, and what they viewed as a risky breakthrough opportunity to be avoided.

There was no focus on users beyond adjacent markets, due to the avoidance of the periphery. With the strategic focus on core and adjacent markets, Case E did not seek to identify or validate opportunities in breakthrough environments. There was no emphasis on acquisition or investments, or on product evaluation, beyond adjacent markets.

Case E did not work with individuals or organisations beyond adjacent markets. With an explicit fast follower approach, more attention was focused on learning from competitors, and moving fast to exploit opportunities, than scanning the periphery. Of the 6 interviewees questioned in this area, 2 thought the organisation had a systematic way of searching the periphery of the business environment for innovation and NPD opportunities, and 4 did not.

Does the organisation have a systematic way of searching the periphery of your business environment for innovation and NPD opportunities?		
Yes: 2	No: 4	Question not asked: 0

4.15 Case F: Medium sized commercial publisher

4.15.1 Background on the company and the interviewees

The company was a medium sized, privately owned publisher of journals and books, mainly focused on social science. The firm was around 50 years old, and had expanded through growing the portfolio, and through an aggressive approach to increasing sales in emerging geographic markets. The overall sense of the company at the time of the interviews was of significant cultural and organisational change. The business was dependent on the core market for around 85% of revenues.

The organisation had extremely close relationships with librarians, but was not as close to researchers as most competitors, particularly in North America. At the time of the interviews the company had just completed a major migration of its web platform to a new provider.

The interviewees had, on average, been with Case F for 5.3 years, as compared to the sample's average time with the same publisher being 10.3 years. This was the second lowest of the sample.

While the overall sample had spent an average of 17 years in publishing, the interviewees had spent an average of 13.1 years in the sector. Many of the interviewees had been recruited from other, larger publishers, to support the development of core processes in the core business.

4.15.2 Comments on the core business

The overall capability rating regarding core markets was 21 out of 30.

The business had a strategic plan for the core business, focused on making operational improvements, building in agile and flexible processes. The implementation of the strategic plan was in progress at the time of the interviews. The plan included recruiting staff with industry experience to improve operational effectiveness. Growth had been achieved through expansion into new geographic markets.

The organisation ran ongoing surveys with librarians and authors, in terms of service quality. The search and select processes focused on the core were mostly driven at the subject level, and considered subject coverage opportunities. However, responsibility for searching for innovation and NPD opportunities in the core business was seen as being relatively clear.

Is it clear who is responsible for searching for innovation and NPD opportunities in the core business?		
Yes: 5	No: 1	Question not asked: 6

The core business maintained some strategic relationships with senior university opinion leaders and accreditation agencies. Case F was very closely connected to the librarian community. Connections at senior levels with librarians and faculty in North America, the

sector's most important source of revenue and high quality research, were perceived to be weak.

Overall, there had been some analysis of usage patterns, assessing how users navigate through web platforms. While the organisation was starting to move to a greater user orientation, rather than a strong B2B DMU orientation, this was nascent.

The organisation ran ongoing surveys with librarians and authors, considering service quality. There had been little work to understand researcher and wider user workflow: "Beyond talking to non-librarians in the market about submitting content or managing content, our inquisitiveness has been real but our ability or desire to act on any novel or suggested changes that someone might want hasn't been delivered." The importance of increasing market insight capability was identified as a priority.

Beyond one recent development project, there were no references to past successful efforts to identify new problems that the company could address commercially, with an informant commenting: "I wouldn't say particularly that we are great at solving and being creative with problems to generate opportunities." OA opportunities were being pursued, in a relatively low-key manner, with OA requirements having only hit this mainly social science publisher relatively recently.

Reference was made to the use of MVP techniques and agile technology management in the future, but there were no tangible signs or indications of this being in place at the time of the interviews.

The company recruited staff from outside the industry, bringing in different perspectives: "One of the things that we've done in forming the new (innovation group), is to bring in people with new perspectives and new skill sets."

Case F actively identified acquisition opportunities, and acquired content targeting the core market. Collaboration with external organisations focused more on suppliers, e.g. web platform providers, rather than on product development.

The organisation did not have effective knowledge management systems to support innovation activities in the core business.

Does the organisation have an effective knowledge management, or other system, to support innovation and NPD processes in the core business?

Yes: 0

No: 7

Question not asked: 5

4.15.3 Findings regarding adjacent market environments

The overall capability rating regarding adjacent market environments was 16 out of 30.

Case F had recently acquired a company in an adjacent market. The findings from the newly acquired organisation boosted the results regarding innovation capability for adjacent markets significantly. Little reference was made to strategic plans to explore beyond core markets, with the connection with key buyers (librarians) in core markets perceived as being very strong. A new NPD and innovation department had just been established at the time of the interviews, but the company's strategy for adjacent and breakthrough environments was emergent, rather than established. Acquisition had been used assertively to enter adjacent markets.

The company aimed to move to a portfolio approach, with effective market insight, but while referred to, this was not established at the time of the interviews. The company maintained a strong content rather than solutions focus. The difficulties of considering adjacent opportunities were explained: "95% of efforts in the business are tagged and tied into selling, marketing, producing content for, managing the prices and business model of the core." An interviewee commented: "(We) have not done a lot yet to develop new solutions, so we are in the R&D phase. More of the R phase than the D phase actually." One adjacent market initiative was mentioned a number of times.

Of the eight interviewees questioned, all eight thought that it was clear who is responsible for searching for innovation and NPD opportunities, beyond the core business. The sense of clarity came from the creation of the new innovation and NPD

group.

Is it clear who is responsible for searching for innovation and NPD opportunities beyond the core business?		
Yes: 8	No: 0	Question not asked: 4

Strategic relationships with senior university opinion leaders and accreditation agencies were mainly connected to the core business, and the firm was closely connected to the librarian community. Case F was relatively poorly connected to industry bodies and industry initiatives beyond its core stakeholders. The organisation had weak connections to scholarly societies, limiting insights from this potential partnership group.

The lack of focus on users extended to a lack of insight into the workflows of researchers and other stakeholders. The sharing of market feedback was limited: “I share market feedback with the immediate team, and with the wider department, and then (through) ad hoc conversations. But there’s no structured way of doing it.” The new innovation group was using an open innovation based ideation tool.

The company that had recently been acquired in an adjacent area was exploring emergent opportunities with multiple stakeholders. The newly acquired company used social channels extensively to identify pervasive problems requiring solutions, as well as through developing connections with the funders of research.

The interviews referred to the use of the MVP approach, and agile technology management, in the future, but there were no tangible signs or indications of this being in place. The organisation had just finished a major migration of its technology platform, which had limited the flexible use of technology in the recent past.

Case F recruited staff from outside the industry, bringing in different perspectives: “One of the things that we’ve done in forming the new (innovation group), is to bring in people with new perspectives and new skill sets.” The company identified opportunities in adjacent markets through acquisition, and was prepared to follow through and acquire them.

The organisation did not have effective knowledge management systems to support innovation activities beyond the core business.

Does the organisation have an effective knowledge management, or other system, to support innovation and NPD processes beyond the core business?

Yes: 0	No: 9	Question not asked: 3
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4.15.4 Findings regarding breakthrough market environments

The overall capability rating regarding breakthrough markets was 1 out of 33, with Case F demonstrating no established capabilities across the 11 search and select priority processes.

Case F had no strategic or operational plans considering peripheral opportunities. The interviews did not reveal an interest in opportunities beyond adjacent markets

There was little reference to strategic plans to explore more than core and adjacent markets, as the core markets and the connection with key buyers (librarians) was very strong, and the recent acquisition in an adjacent area was relatively new. There was no reference to plans beyond adjacent opportunities. There was no structured search and select activity in breakthrough environments. The aim of moving to a portfolio approach with effective market insight was aspirational, but had not been established at the time of the interviews.

The organisation did not have a systematic way of searching the periphery of their business environment for innovation and NPD opportunities, as shown below.

Does the organisation have a systematic way of searching the periphery of your business environment for innovation and NPD opportunities?

Yes: 0	No: 8	Question not asked: 4
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4.16 Findings summary: University press publishers

The table below summarises the main findings regarding how university press publishers managed NPD search and select processes in core, adjacent, and breakthrough environments.

University presses are responsible for 4% of article output (Ware & Mabe, 2015 pp. 45).

Innovation Search and Select Capabilities in Adjacent and Breakthrough Environments	Case G Core	Case G Adjacent	Case G Breakthrough	Case H Core	Case H Adj	Case H Breakthrough
What Does A HE Publisher Need To Be Able To Do?						
1) Guided by high level strategic plan: core, adjacent and breakthrough/peripheral opportunities	2	2	0	2	0	0
2) Search the periphery for innovation & NPD opportunities	N/A	N/A	0	N/A	N/A	0
3) Operationalise structured Search & Select processes: Adjacent and Breakthrough opportunities	2	2	0	2	0	0
4) Seek out and share deep contextual domain insights	3	3	1	2	2	0
5) Seek out & share deep domain insights into user workflows	3	2	0	1	1	0
6) Deploy digital era market research techniques (e.g. netnography)	2	2	0	1	0	0
7) Identify and validate "big enough" pervasive problems requiring solutions	3	2	0	1	0	0
8) Validate and iterate opportunities through MVP testing & learning	3	2	0	1	0	0
9) Recruit, connect with & learn from individuals outside core industry	2	0	0	1	1	0
10) Identify & validate external acquisition & investment opportunities	0	0	0	0	0	0
11) Invest in, acquire, and/or collaborate with "different thinking" external organisations (i.e. follow through)	2	1	0	0	0	0
	22	16	1	10	4	0

Table 4.7: How university press publishers manage the innovation search and select processes in core, adjacent, and breakthrough environments

4.17 Case G: University press

4.17.1 Background on the company and the interviewees

The university press (UP) was owned by one of the top ten universities globally (*World University Rankings 2015-16*, 2015), and published journal content, books and case based material.

The organisation was highly focused on particular aspects of the social sciences. The core business had historically concentrated on selling content to the world's leading 250 universities worldwide. The widespread take up of the iPad and other tablet computers had transformed how the company's core masters student consumers accessed content in class.

The interviewees had been with Case G for an average of 12.3 years, as compared to the average time with the same publisher of 10.3 years. While the overall sample had spent an average of 17 years in publishing, the interviewees had spent an average of 16.5 years in the sector.

4.17.2 Comments on the core business

The overall capability rating regarding core markets was 22 out of 30.

The organisation had a clear definition of the core business, focused on the top 250 institutions worldwide, and had a clearly articulated plan to build out from these core customers to the institutions ranked 250 – 500 in the world.

The UP had a fairly structured approach to search and select in the core market, using stage-gate processes. Responsibility for searching for innovation and NPD opportunities in the core business was clear to two interviewees, and was not clear to two more.

Is it clear who is responsible for searching for innovation and NPD opportunities in the core business?

Yes: 2

No: 2

Question not asked: 0

The organisation was highly connected with HE stakeholders, as a division within a publisher owned by one of the world's most respected universities. They were guided by a senior advisory committee, including academics, programme administrators, learning technologists and bloggers.

The interviewees reported increased exploitation of usage data, and they used agencies to assess online experiences, deploying a mix of quantitative and qualitative research approaches: "Increasingly what we're trying to do is pair a survey with links that go to something experiential, because we're increasingly realising that we can't get, via text, valid customer feedback on something that is more experiential."

The university press integrated products with the workflows of other organisations and other educators. The organisation identified the "jobs-to-be-done" of stakeholders through close connections with teachers.

There was no reference to individuals from outside the industry, apart from the use of market research agencies.

As a publisher owned by a university, the acquisition of companies, or investment in other companies, was not possible, removing acquisition as a vector through which opportunities could be developed. There was no reference to collaboration with organisations from outside the industry, apart from the use of market research agencies, and technology suppliers, where Case G worked with organisations from outside the publishing industry.

The organisation did not have effective knowledge management systems to support innovation activities in the core business.

Does the organisation have an effective knowledge management, or other system, to support innovation and NPD processes in the core business?

Yes: 0

No: 4

Question not asked: 0

4.17.3 Findings regarding adjacent market environments

The overall search and select capability rating regarding adjacent markets was 16 out of 30.

The university press was well connected with leading stakeholders in business education, and had an “edge out from the core” approach to innovation and NPD. The organisation possessed many of the capabilities needed to search for and select innovation opportunities in adjacent markets, particularly in “near-adjacent” sectors.

With a reasonably clear definition of the core business, Case G was also clear as to the markets and opportunities they wanted to pursue in adjacent areas. Initiatives were in place to operate in adjacent product areas.

The UP was very structured in the way that it managed market research, which was heavily skewed towards the core market, due to the historic focus on the core business. While research was taking place into adjacent opportunities, this was a relatively new activity. Geographical expansion was a major part of the organisation’s strategic plan. However, it was not clear who was responsible for searching for innovation and new NPD opportunities beyond the core business.

Is it clear who is responsible for searching for innovation and NPD opportunities beyond the core business?

Yes: 0

No: 4

Question not asked: 0

As a department within a leading university, Case G was guided by a senior advisory committee. The organisation had multiple connections with Deans, and other senior academics, due to the reputation of the publisher. Connections were in place with educational technologists. They watched competitors closely. The interviews revealed a deep understanding of the workflows of teachers as they prepare to teach, and how they managed the classroom. They learned from the host university, and their emerging educational approaches.

Case G had started to use conjoint analysis to understand adjacent opportunities, including potential business models. Market research was highly valued, and new techniques were being deployed. The organisation was exploring beyond the core customer base into adjacent customer sectors, seeking to understand the emerging teaching and learning challenges and pervasive problems encountered in the digitally enabled classroom.

There were no comments concerning the recruitment of individuals from outside the core industry considering adjacent markets.

The UP had adopted agile working practices, and used MVP techniques to secure customer feedback. They sought data on MVP usage, aiming for high stakeholder engagement and measurable business impact, including learning analytics.

The organisation did not have effective knowledge management systems to support innovation activities beyond the core business.

Does the organisation have an effective knowledge management, or other system, to support innovation and NPD processes beyond the core business?		
Yes: 0	No: 4	Question not asked: 0

4.17.4 Findings regarding breakthrough market environments

The overall capability rating regarding breakthrough markets was 1 out of 33, with Case G demonstrating no established capabilities across the 11 key search and select processes identified in the literature review. Case G did not pursue growth opportunities in breakthrough environments. There was no strategic plan considering breakthrough markets.

No respondents considered that Case G had a systematic way of searching the periphery of the business environment for innovation and NPD opportunities.

Does the organisation have a systematic way of searching the periphery of your business environment for innovation and NPD opportunities?		
Yes: 0	No: 4	Question not asked: 0

4.18 Case H: University press

4.18.1 Background on the company and the interviewees

The UP was owned by one of the top ten universities globally (*World University Rankings 2015-16, 2015*), and published journals and books. While the company had high quality content in certain STM areas, the greatest strength in the content portfolio lay in the humanities and social sciences, where researchers and users tend to lag their peers in STM subject areas in terms of adopting new technology and working routines. At the time of the interviews the company was engaged in preparing for a major migration of its web platform to a new internal platform.

The interviewees had, on average, been with Case H for 9.7 years, as compared to the sample's average time with the same publisher being 10.3 years. While the overall sample had spent an average of 17 years in publishing, the interviewees had spent an average of 17.5 years in the sector.

4.18.2 Findings regarding core market environments

The overall capability rating regarding core markets was 10 out of 30.

Case H was a very traditional publisher, focused on content quality in core markets, with the editorial division highly influential. The organisation had not looked beyond the core business, as resources were committed to “catching up” in the rapidly changing core market. The core business was focused on incremental, “catch up” innovation, particularly regarding operational processes. The strength of the firm’s brand had traditionally been key to securing high quality content.

The search and select process in terms of product development had historically been driven by the editorial department. The overall sense was that the editorial department were responsible for product development, when a respondent felt that responsibility was clear. A stage-gate process was being implemented in the core business to support product development. The organisation was managing a complex web platform migration project at the time of the interviews, which restricted the ability of staff to develop technology based solutions until after the project was completed. The lack of clear responsibilities for searching for innovation and NPD opportunities in the core business was reflected by the mixed response in the table below.

Is it clear who is responsible for searching for innovation and NPD opportunities in the core business?		
Yes: 5	No: 6	Question not asked: 0

Editorial staff were deeply connected with their subject areas in the core business. Case H had prestigious content in certain subjects, with active advisory boards providing strategic input, but only at the subject level. Close connections existed with scholarly societies. The UP benefited from connections with its parent university, particularly when it came to branding, but there was no established process to generate insights from this relationship to inform the firm’s priorities.

The focus was overwhelmingly on content, and relationships with buyers (librarians), rather than users. A major quantitative study into researcher needs had been undertaken, but there was no in-depth focus on workflow. Case H used traditional focus groups and surveys to understand the needs of researchers and librarians in core markets. However, the amount of market research undertaken appeared low.

The firm understood the needs of different subject communities, in terms of the content required to support research and learning. The organisation's attention and resources were dedicated to sustaining competitiveness in core markets, rather than on identifying new pervasive problems with profit potential: "I would say on balance, more ideas come to us than we generate at the moment. I think we are still more of a recipient of others ideas" explained one interviewee. Another said: "We are inherently extremely cautious." Case H had occasionally used pilot projects to test out ideas and technology in the core business, but there were few signs of a culture of experimentation.

The firm recognised that it needed to address OA and new business model issues, and had recently recruited an individual to develop an offering to meet the needs of OA research dissemination. As a publisher owned by a university, the acquisition of companies was not an option that was readily available to develop growth. Case H was highly focused on its core markets, and there was no reference to contact with organisations from outside the industry, apart from the limited use of market research agencies. The firm had commercial relationships with scholarly societies, exposing it to different sources of market feedback.

None of the sample considered that the organisation had effective knowledge management systems to support innovation activities in the core business.

Does the organisation have an effective knowledge management, or other system, to support innovation and NPD processes in the core business?

Yes: 0

No: 11

Question not asked: 0

4.18.3 Findings regarding adjacent market environments

The overall capability rating regarding adjacent market environments was 4 out of 30. Case H had not looked beyond the core business, as resources were allocated to “catching up” in the rapidly changing core market: “Recently nothing has been selected for further development (beyond the core), as we’ve just not had the resource of doing anything beyond the core.” An interviewee commented: “We’re not really very successful beyond the core, I think we’ve had many, many years of understanding really well how to do a certain model of publishing.”

Geographic expansion into underserved core markets was seen as innovation: “From the market lens we would say Europe and North America are very much the core markets, with the acknowledgment that we also need developing markets in that picture.” There was no commentary about solving different or emergent problems for stakeholders. With no structured search and select process for adjacent markets, nine out of ten respondents did not feel that responsibility for searching for innovation and NPD opportunities beyond the core business was clear.

Is it clear who is responsible for searching for innovation and NPD opportunities beyond the core business?		
Yes: 1	No: 9	Question not asked: 1

The interviewees were fully engaged with improving operational processes and achieving sales objectives, and the appetite to engage in challenges facing the publishing industry beyond the core was limited. There was no reference to usage data analysis beyond the core, or the use of market research of any kind beyond core markets. The UP was not identifying or validating opportunities beyond the core market. With no activities in adjacent markets, there were no signs of MVP testing and learning beyond the core market.

There appeared to be little contact with individuals outside the core industry, apart from a recent OA related recruitment. Case H did not collaborate in adjacent markets with outside organisations. None of the respondents believed that the UP had effective knowledge management systems to support innovation activities beyond the core business.

Does the organisation have an effective knowledge management, or other system, to support innovation and NPD processes beyond the core business?		
Yes:	No: 10	Question not asked: 1

4.18.4 Findings regarding breakthrough market environments

The overall capability rating regarding breakthrough markets was 1 out of 33, and Case H did not demonstrate that any of the 11 key search and select capabilities were in place to support NPD in breakthrough environments. The organisation had no strategic or operational plans considering peripheral opportunities. None of the respondents felt Case H had a systematic way of searching the periphery of the firm's business environment for innovation and NPD opportunities.

Does the organisation have a systematic way of searching the periphery of your business environment for innovation and NPD opportunities?		
Yes: 0	No: 10	Question not asked: 1

4.19 Findings summary: Scholarly society publishers

The table below summarises the main findings regarding how scholarly society publishers manage innovation search and select processes in core, adjacent, and breakthrough environments.

Society publishers are responsible for 30% of article output (Ware & Mabe, 2015. p. 45).

Innovation Search and Select Capabilities in Adjacent and Breakthrough Environments	Case I Core	Case I Adjacent	Case I Breakthrough	Case J Core	Case J Adjacent	Case J Breakthrough
What Does A HE Publisher Need To Be Able To do?						
1) Guided by high level strategic plan: core, adjacent and breakthrough/peripheral opportunities	3	2	0	3	3	0
2) Search the periphery for innovation & NPD opportunities	N/A	N/A	1	N/A	N/A	1
3) Operationalise structured Search & Select processes: Adjacent and Breakthrough opportunities	2	2	0	3	2	0
4) Seek out and share deep contextual domain insights	3	3	2	3	3	2
5) Seek out & share deep domain insights into user workflows	3	3	0	3	1	0
6) Deploy digital era market research techniques (e.g. netnography)	2	1	0	2	2	0
7) Identify and validate "big enough" pervasive problems requiring solutions	3	2	0	3	2	0
8) Validate and iterate opportunities through MVP testing & learning	2	2	0	3	2	0
9) Recruit, connect with & learn from individuals outside core industry	0	0	0	1	1	0
10) Identify & validate external acquisition & investment opportunities	0	0	0	0	0	0
11) Invest in, acquire, and/or collaborate with "different thinking" external organisations (i.e. follow through)	2	2	0	1	0	0
	20	17	3	22	16	3

Table 4.8: How society publishers manage the innovation search and select processes in core, adjacent, and breakthrough environments

4.20 Case I: Society publisher

4.20.1 Background on the company and the interviewees

Case I was a major department within a highly prestigious scholarly society, publishing paid for and OA content in STM subject areas.

The organisation was relatively small, but extremely agile, adopting a “Fast Second” (Markides & Geroski, 2005) approach. The organisation had grown its range of journals in recent years, and had been successful in adopting new OA business models. The publisher ran OA activities within the core business, seeing OA publishing as merely a different business model for dissemination and revenue generation.

The interviewees had been with Case I for an average of 11.9 years, as compared to the sample average time with the same publisher of 10.3 years. While the overall sample had spent an average of 17 years in publishing, the interviewees had spent an average of 17.4 years in the sector.

4.20.2 Findings regarding core market environments

The overall capability rating regarding core markets was 20 out of 30.

Due to the science focused mission of the scholarly society, the organisation was focused on producing and disseminating scientific output, and had a clear strategy for its core markets. The organisation took a fast follower approach regarding technology and business models. An exception to the fast follower approach occurred when the organisation took risks with the OA business model, confirming the OA opportunity through early market testing and learning.

The clarity of responsibilities is reflected in the table below.

Is it clear who is responsible for searching for innovation and NPD opportunities in the core business?

Yes: 4

No: 0

Question not asked: 0

Despite resource restrictions, the publisher actively managed search and select processes in core markets, watching competitors very closely. Due to a clear dissemination objective, they were willing to use new business model approaches such as OA aggressively.

The scholarly publisher was closely connected with scientific research communities globally. The organisation worked closely with funders, and provided advice to the UK government. They worked closely with other scholarly societies, in non-competing subject areas, using non-disclosure agreements. Close working relationships were in place with editorial boards, authors, and the Fellows of the society. Case I was close to the OA community, and had been a major innovator in terms of business and publishing models.

The scholarly society focused on understanding the motivations and service requirements of authors, seeing authors as the number one priority. Case I used web analytics to understand researcher behaviours. Close connections with authors and funders to understand the motivations of researchers had helped to identify that the requirement for OA was a pervasive problem that they could solve.

As a small organisation, they chose to manage OA activity within the core, lacking the resources to set up a separate structure to support what was initially an internally disruptive process. Case I used surveys to confirm ideas and opportunities.

The organisation did not operate a widespread MVP approach, but sought feedback from users on developments in the core offering. Operating as a fast follower, they worked quickly with suppliers, e.g. web platform partners, to implement technologies and approaches which appeared to have been successful for other publishers. There were no references to connecting with individuals outside the core publishing industry.

Case I was owned by a scholarly society, making the acquisition of companies, or investment in other companies complex due to the mission of the holding organisation. Scholarly society owned publishers were not able to use acquisition or investment in external organisations as a means to develop growth.

Small start-up companies regularly approached the society, looking to develop their technology and demonstrate that their products benefit a prestigious organisation. The society collaborated with smaller companies with interesting new services, pushing pilots out into user communities.

The organisation had effective knowledge management approaches (rather than systems) to support innovation activities in the core business. Case I was a small organisation, and communication between the externally facing leadership team was good.

Does the organisation have an effective knowledge management, or other system, to support innovation and NPD processes in the core business?

Yes: 4

No: 0

Question not asked: 0

4.20.3 Findings regarding adjacent market environments

The overall capability rating regarding adjacent market environments was 17 out of 30.

While the organisation saw itself as focused on the core business, the mission of Case I was focused on research dissemination in the wider sense, and they considered the issues and opportunities affecting the dissemination of research, whatever the business model. The research dissemination imperative broadened their focus to include adjacent opportunities when considering OA publishing, where they had been in the forefront of operational and business model developments.

The main feedback from Case I was that no-one was responsible for looking beyond the core, as the mission of the organisation was to focus on core publishing activity. The responses of the interviewees to questions about adjacent market environments were influenced by the fact that OA publishing was located in the core of their operation, rather than as a more adjacent activity.

Is it clear who is responsible for searching for innovation and NPD opportunities beyond the core business?

Yes: 0

No: 4

Question not asked: 0

Case I watched competitors very closely, following them fast when new initiatives were proving successful for them. They had been in the vanguard of OA publishing, and were open to trying out different business models, when it supported the dissemination of STM research.

The scholarly publisher was closely connected with STM research communities globally. With tight links to funders and government, they worked closely with other scholarly societies, in non-competing subject areas. Close connections existed with the OA community, extending beyond core markets.

The scholarly society focused on understanding the motivations and service requirements of authors, and saw authors as the number one priority. They used their close connections with authors and funders to understand the motivations of researchers. They focused on the needs of users (individuals), rather than just the institution or library buying their content.

With a high focus on core markets, there was less use of market research in adjacent markets than in the core. The organisation valued market research to validate decision making. Closeness to the researcher community enabled the organisation to identify and respond to emerging pervasive problems, such as OA, in adjacent environments. Case I did not operate a formal MVP approach, but did seek feedback from users on its OA offering.

There were no references to connecting with individuals outside the core publishing industry. Case I worked with start-up companies on trials, as long as involvement was not expensive or overly time consuming.

The interviewees did not feel effective knowledge management systems were in place to support innovation activities beyond the core business. The main feedback from the society was that no-one was responsible for looking beyond the core, as the mission of the organisation was to focus on core publishing activity.

Does the organisation have an effective knowledge management, or other system, to support innovation and NPD processes beyond the core business?		
Yes: 0	No: 3	Question not asked: 1

4.20.4 Findings regarding breakthrough market environments

The overall capability rating regarding breakthrough markets was 3 out of 33, and Case I did not have a strong presence of the 11 key NPD search and select capabilities identified through the literature review in breakthrough environments. Case I had no strategic or operational plans considering peripheral opportunities. However their deep connectedness with the STM community did mean that the organisation did cast an occasional glance at the periphery.

Does the organisation have a systematic way of searching the periphery of your business environment for innovation and NPD opportunities?		
Yes: 0	No: 4	Question not asked: 0

4.21 Case J: Society publisher

4.21.1 Background on the company and the interviewees

The publisher was owned by a highly prestigious scholarly society, and published journals and e-books. The organisation was around the same size as Case F, and had been growing strongly over recent years, particularly through securing contracts to publish on behalf of other societies.

Operating in a dynamic area of STM research, the organisation had expanded into new “near-adjacent” subject areas, as well as launching a successful range of e-books.

The interviewees had been with Case J for an average of 6.9 years, as compared to the sample’s average time with the same publisher of 10.3 years. While the overall sample had spent an average of 17 years in publishing, the interviewees had spent an average of 21 years in the sector.

4.21.2 Findings regarding core market environments

The overall capability rating regarding core markets was 22 out of 30.

A strategic framework was in place. Case J was highly focused on its core markets, but also managed a conscious “edge out” strategy into “near adjacent” areas, e.g. e-books.

A prioritisation, planning and strategic portfolio working group was in place. Case J used the same staff, processes and systems to develop core and adjacent opportunities. Open Access (new business model) publishing was managed within the core business. E-books were a new category for the society, and they had developed an award winning portfolio. This project had originally been managed as a separate project, but had subsequently moved to being managed within the core.

The search and select processes were not felt to be particularly clear, with an interviewee commenting: “We use ‘product development’ in at least three different ways in this organisation.” In terms of searching for opportunities, the interviewees felt that responsibility for the activity was clear, as shown in the table below.

Is it clear who is responsible for searching for innovation and NPD opportunities in the core business?		
Yes: 5	No: 1	Question not asked: 0

The society publisher was extremely connected to the subject area, funders, government, publisher and library organisations and customers. The organisation had deep connections with the researcher community, and strong business intelligence capability, providing insights into user behaviour and motivations.

Case J had a respected market intelligence group, with data modelling capabilities. They used external organisations for some market research projects, employing a mix of qualitative and quantitative research.

The “edge out” approach taken by the organisation was focused on subject and format (e.g. e-book) opportunities. The measured “edge-out” approach enabled the organisation to validate the size of the opportunities that they were contemplating. As an STM publisher, they had recognised the importance of the OA requirements of authors and funders early on. OA activities had been managed proactively. Case J used a peer-review process to validate opportunities.

There was some reference to connections with individuals from outside the industry. Connections with individuals beyond publishing were clearest within the networks of more IT focused staff. Agile/scrum development techniques had been adopted.

Case J was owned by a scholarly society, making the acquisition of other companies complex due to the mission of the holding organisation. The organisation worked with external market research companies.

The organisation did not have effective knowledge management systems to support innovation activities in the core business.

Does the organisation have an effective knowledge management, or other system, to support innovation and NPD processes in the core business?

Yes: 2	No: 4	Question not asked: 0
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4.21.3 Findings regarding adjacent market environments

The overall capability rating regarding adjacent market environments was 16 out of 30.

Case J had an “edge out” strategy into “near adjacent” areas, such as with e-books, and into emerging subject areas aligned with core publishing areas, and used the same people, processes and systems to develop core and adjacent opportunities. The organisation had managed major change projects such as OA and e-books outside the core at the early stages of development, and then moved them into the core once processes, and success, had been established.

Responsibilities in adjacent markets were clear to three out of five respondents, as shown in the table below.

Is it clear who is responsible for searching for innovation and NPD opportunities beyond the core business?

Yes: 3	No: 2	Question not asked: 1
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Case J was highly connected to the subject area, funders, government, publisher and library organisations and customers. While deep connections with the researcher community were in place, there was no particular focus on users or workflow beyond the core, apart from OA related processes and motivations.

The market intelligence group provided capability for digital era market research activities, using external agencies for some projects. Case J's success with e-books and OA initiatives reflected their ability to identify pervasive problems in adjacent areas.

The range of opportunities considered in adjacent areas was lower than for the core, and MVP testing and learning techniques were deployed to support the project management of these initiatives.

The technology staff made reference to their connections with individuals outside the core publishing industry. The organisation worked with external market research companies in adjacent markets. The organisation did not have effective knowledge management systems to support innovation activities beyond the core business.

Does the organisation have an effective knowledge management, or other system, to support innovation and NPD processes beyond the core business?		
Yes: 1	No: 4	Question not asked: 1

4.21.4 Findings regarding breakthrough market environments

The overall capability rating regarding breakthrough markets was 3 out of 33, and Case J had not established the 11 key NPD search and select capabilities in breakthrough environments. Case J had no strategic or operational plans considering peripheral opportunities. Their deep knowledge of the issues affecting STM stakeholders gave them an awareness of issues on the periphery, despite a lack of formal process considering breakthrough opportunities.

The organisation did not have a systematic way of searching the periphery of the business environment for innovation and NPD opportunities, as shown below.

Does the organisation have a systematic way of searching the periphery of your business environment for innovation and NPD opportunities?		
Yes: 1	No: 5	Question not asked: 0

4.22 Cross case findings: Core markets

Having established the presence of NPD search and select capabilities at the case company level, it is useful to look for patterns in the findings through:

- Analysing the similarities and the differences between the three large commercial publishers (Cases A, B and D) and single medium commercial publisher (Case E) with a capability rating of more than 25 in the core market
- Analysing the similarities and the differences between the large commercial publisher (Case C), single medium commercial publisher (Case F), single university press (Case G) and two scholarly society publishers (Cases I and J), with a capability rating of between 20 and 25 in the core market
- Consider the case of the single university press (Case H) with a capability rating of below 20 in the core market

4.23 Cross case findings: Adjacent markets

Following analysis of the presence of innovation search and select capabilities at the case company level, it is useful to look for patterns in the findings regarding adjacent markets through:

- Analysing the similarities and the differences between the three large commercial publishers (Cases A, B and D) and single medium commercial publisher (Case E) with a capability rating of more than 25 in adjacent markets
- Analysing the similarities and the differences between the large commercial publisher (Case C), single medium commercial publisher (Case F), single university press (Case G) and two scholarly society publishers (Cases I and J), with a capability rating of between 20 and 10 in adjacent markets.
- Consider the case of the single university press (Case H) with a capability rating of below 10 in adjacent markets

4.24 Cross case findings: Breakthrough environments

Building on the analysis of the presence of innovation search and select capabilities at the case company level, the patterns in the findings regarding breakthrough environments demand analysis through:

- Analysing the similarities and the differences between the two large commercial publishers (Cases B and D) with capability ratings of more than 25 in breakthrough environments
- Analysing the similarities and the differences between the two large commercial publishers (Cases A and C), two medium commercial publishers (Cases E and F), two university presses (Case G and H) and two scholarly society publishers (Cases I and J), with a capability rating below 10 in breakthrough environments

4.25 Core markets

Cases A, B, D and E were all highly effective across the 10 search and select capabilities. The only ratings below a “3” (Capability well established, with consistent and clear references to ongoing activities) are identified in the table below.

Case	Overall Capability Rating Core	Innovation Search and Select Capability Areas For Improvement	Capability Rating	Researcher Comments
Case A	28	9) Recruit, connect with & learn from individuals outside core industry	1	Recruitment still seemed to target core industry professionals. The sample had the longest average experience any of the case companies, and an average of 21.3 years in publishing
Case B	30	N/A		All the capabilities were well established, with consistent and clear references to ongoing activities. Repeated references to the recruitment of technology staff from outside the industry boosted their rating on Capability 9. The sample of 3 senior respondents averaged 2.2 years with Case B, and an average of 5.2 in the industry
Case D	29	9) Recruit, connect with & learn from individuals outside core industry	2	Core industry professionals prominent in the core, based on the 5 interviews
Case E	27	8) Validate and iterate opportunities through MVP testing & learning	2	MVP testing approach less prominent than with some other cases
Case E	27	9) Recruit, connect with & learn from individuals outside core industry	1	Core industry professionals prominent in the core

Table 4.9: Core Markets: Innovation search and select capability analysis

Similar capability ratings do not signify that Cases A, B, D and E were all managing the 10 search and select capabilities in the same way, or to the same standard, as the qualitative research techniques used for the project could only assess the presence of capabilities, not the quality of the management of the capabilities.

4.26 Comparing capabilities between core and adjacent markets: The leading organisations

An important finding from the research project was that the four companies with the strongest capability ratings in core markets also demonstrated the strongest capability ratings in adjacent markets, as shown below.

Innovation Search and Select Capabilities in Core, Adjacent & Breakthrough Environments	Case A Core	Case A Adjacent	Case B Core	Case B Adjacent	Case D Core	Case D Adjacent	Case E Core	Case E Adjacent
1) Guided by high level strategic plan considering Core, Adjacent and Breakthrough	3	2	3	3	3	3	3	3
2) Search the periphery for innovation & NPD opportunities	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3) Operationalise structured Search & Select processes across Core, Adjacent and Breakthrough opportunities	3	2	3	3	3	3	3	3
4) Seek out and share deep contextual domain insights, e.g. macro social and technology trends	3	3	3	3	3	3	3	3
5) Seek out & share deep domain insights into user workflows	3	3	3	3	3	3	3	3
6) Deploy digital era market research techniques (e.g. netnography)	3	3	3	3	3	3	3	3
7) Identify and validate "big enough" pervasive problems requiring solutions	3	3	3	3	3	3	3	3
8) Validate and iterate opportunities through MVP testing & learning	3	2	3	3	3	3	2	1
9) Recruit, connect with & learn from individuals outside core industry	1	2	3	3	2	2	1	1
10) Identify & validate external acquisition & investment opportunities	3	3	3	3	3	3	3	3
11) Act on analysis, investing in, acquiring, and/or collaborating with external organisations	3	3	3	3	3	3	3	3
	28	26	30	30	29	29	27	26

Table 4.10: Comparing capabilities between core and adjacent markets: The leading organisations

A clear but not unexpected finding is that none of the 10 Case company studies were more capable in adjacent markets than in their core markets.

4.27 Comparing capabilities between core and adjacent markets: The organisations with a marked difference in capability levels

The analysis below summarises the similarities and the differences in how organisations managed search and select in disrupting environments regarding the large commercial publisher (Case C), single medium commercial publisher (Case F), single university press (Case G) and two scholarly society publishers (Cases I and J), with a capability rating of between 25 and 20 in the core market, alongside the capability ratings of the case companies in adjacent markets.

Innovation Search and Select Capabilities in Core, Adjacent & Breakthrough Environments	Case C Core	Case C Adjacent	Case F Core	Case F Adjacent	Case G Core	Case G Adjacent	Case I Core	Case I Adjacent	Case J Core	Case J Adjacent
What Does A HE Publisher Need To Be Able To Do?										
1) Guided by high level strategic plan considering Core, Adjacent and Breakthrough	3	1	2	1	2	2	3	2	3	2
2) Search the periphery for innovation & NPD opportunities	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3) Operationalise structured Search & Select processes across Core, Adjacent and Breakthrough opportunities	3	1	2	1	2	2	2	2	2	2
4) Seek out and share deep contextual domain insights, e.g. macro social and technology trends	3	3	2	1	3	3	3	3	3	3
5) Seek out & share deep domain insights into user workflows	2	1	1	1	3	2	3	3	3	1
6) Deploy digital era market research techniques (e.g. netnography)	1	1	2	2	2	2	2	1	2	2
7) Identify and validate "big enough" pervasive problems requiring solutions	3	1	2	1	3	2	3	2	3	2
8) Validate and iterate opportunities through MVP testing & learning	2	1	1	1	3	2	2	2	3	2
9) Recruit, connect with & learn from individuals outside core industry	1	2	2	2	1	0	0	0	1	1
10) Identify & validate external acquisition & investment opportunities	3	1	3	3	0	0	0	0	0	0
11) Act on analysis, investing in, acquiring, and/or collaborating with external organisations	3	2	3	3	2	1	2	2	1	0
	24	14	20	16	21	16	20	17	21	15

Table 4.11: Comparing capabilities between core and adjacent markets: The organisations with a marked difference in capability levels

Case C demonstrated capability levels at almost the same level as Cases A, B, D and E in core markets, and the organisation had a history of growth in recent years. Recognising that this is an exploratory qualitative study, Case C could have been seen to demonstrate (almost) the same capability levels in the core as Cases A, B, D and E. The reason for categorising Case C alongside Cases F, G, I and J is based on the gap between Case C's search and select capabilities in core markets (24), and its capability rating in adjacent markets (14). Cases C, F, G, I and J, with a collective 146 years of experience, all had capability scores between 14 and 17 when considering relatively unknown adjacent markets.

Cases C, F, G, I and J did not have clear strategic plans for adjacent markets, in contrast to Cases A, B, D and E, which all had clear plans for adjacent markets that were repeatedly referred to throughout the interviews.

4.28 The single university press (Case H) with a capability rating of below 15 in the core market

Innovation Search and Select Capabilities in Adjacent and Breakthrough Environments	Case H Core	Case H Adj
What Does A HE Publisher Need To Be Able To Do?		
1) Guided by high level strategic plan: core, adjacent and breakthrough/peripheral opportunities	2	0
2) Search the periphery for innovation & NPD opportunities	N/A	N/A
3) Operationalise structured Search & Select processes: Adjacent and Breakthrough opportunities	2	0
4) Seek out and share deep contextual domain insights	2	2
5) Seek out & share deep domain insights into user workflows	1	1
6) Deploy digital era market research techniques (e.g. netnography)	1	0
7) Identify and validate "big enough" pervasive problems requiring solutions	1	0
8) Validate and iterate opportunities through MVP testing & learning	1	0
9) Recruit, connect with & learn from individuals outside core industry	1	1
10) Identify & validate external acquisition & investment opportunities	0	0
11) Invest in, acquire, and/or collaborate with "different thinking" external organisations (i.e. follow through)	0	0
	10	4

Table 4.12: The single university press (Case H) with a capability rating of below 20 in the core market

Case H had a reputation for very high quality publications in the core markets, but had struggled to keep up with competitors in the “rapid change core” (RCC), particularly in the area of technology. The organisation was highly focused on content, and its connections with leading researchers, and it appeared that the editorial and content focus had crowded out the development of the operational processes to operate in increasingly digital markets and user environments in both core and adjacent markets.

4.29 Variation in capability ratings in breakthrough environments

The table below compares the capability ratings of all 10 case companies in breakthrough environments.

Innovation Search and Select Capabilities in Breakthrough Environments	Case B Break-through	Case D Break-through	Case A Break-through	Case E Break-through	Case C Break-through	Case I Break-through	Case J Break-through	Case F Break-through	Case G Break-through	Case H Break-through
What Does A HE Publisher Need To Be Able To Do?										
1) Guided by high level strategic plan considering Core, Adjacent and Breakthrough	3	3	2	2	0	0	0	0	0	0
2) Search the periphery for innovation & NPD opportunities	3	3	1	1	1	1	1	0	0	0
3) Operationalise structured Search & Select processes across Core, Adjacent and Breakthrough opportunities	3	3	1	1	0	0	0	0	0	0
4) Seek out and share deep contextual domain insights, e.g. macro social and technology trends	3	3	1	2	2	2	2	1	1	1
5) Seek out & share deep domain insights into user workflows	3	3	1	0	0	0	0	0	0	0
6) Deploy digital era market research techniques (e.g. netnography)	3	3	0	0	0	0	0	0	0	0
7) Identify and validate "big enough" pervasive problems requiring solutions	3	3	1	0	0	0	0	0	0	0
8) Validate and iterate opportunities through MVP testing & learning	3	3	0	0	0	0	0	0	0	0
9) Recruit, connect with & learn from individuals outside core industry	3	3	0	0	0	0	0	0	0	0
10) Identify & validate external acquisition & investment opportunities	3	3	1	0	0	0	0	0	0	0
11) Act on analysis, investing in, acquiring, and/or collaborating with external organisations	3	3	1	0	0	0	0	0	0	0
	33	33	9	6	3	3	3	1	1	1

Table 4.13: Variation in capability ratings across the 10 case companies in breakthrough environments

A significant finding is that of the 10 case companies, only two (Case B and Case D) were actively involved in breakthrough environments, with a maximum 33 out of 33 capability rating regarding focus on uncertain opportunities at a significant distance from the core business. Case A (9) had explored breakthrough opportunities in the past, but had demonstrated a preference for adjacent opportunities. Case E secured a slightly higher capability rating than Cases C, J, I, F, G and H due to the strength of its six-box innovation matrix, which enabled the categorisation of opportunities as being breakthrough in nature, and therefore of no interest to this fast follower organisation which only considered core and adjacent opportunities.

Apart from Cases B and D, none of the case companies were searching for or selecting opportunities in breakthrough environments.

4.30 Cross case findings: Is it clear who is responsible for searching for innovation and NPD opportunities in the core business?

Even though the organisations were all incumbents, and had sustained themselves for an average of 178 years, a significant 15 out of 54 (28%) of those who responded to this question did not feel that it was clear who was responsible for searching for innovation and new product development (NPD) opportunities in the core business, as shown below.

Case Company	Yes	No	Not Asked
A	3	2	2
B	2	1	2
C	3	2	0
D	4	0	1
E	6	0	0
F	5	1	6
G	2	2	0
H	5	6	0
I	4	0	0
J	5	1	0
Totals	39 (72% respondents)	15(28% respondents)	11

Table 4.14: Cross case findings: Is it clear who is responsible for searching for innovation and NPD opportunities in the core business?

4.31 Cross case findings: Effective knowledge management, or other systems, to support innovation and NPD processes in the core business.

Despite extensive experience in core markets, the findings regarding the presence of effective knowledge management, or other systems, to support innovation and NPD processes in the core business revealed a weakness, or a lack of value placed on knowledge management, in the core business.

Case Company	Y	N	Not Asked
A	0	5	0
B	1	0	2
C	2	3	0
D	1	3	1
E	5	1	0
F	0	7	5
G	0	4	0
H	0	11	0
I	4	0	0
J	2	4	0
Totals	15 (28% respondents)	38 (72% respondents)	8

Table 4.15: Cross case findings: Effective knowledge management, to support innovation and NPD processes in the core business

4.32 Cross case findings: Is it clear who is responsible for searching for innovation and NPD opportunities beyond the core business?

Half of the respondents felt that it was clear who was responsible for searching for innovation and NPD opportunities beyond the core business. It should be noted that there was no differentiation between adjacent and breakthrough markets in the way that this question was asked. The fact that 49% of the respondents did not feel that it was clear who was responsible for searching for innovation and NPD opportunities beyond the core business indicates a lack of development of organisational design to manage search activities beyond the core.

A surprising result was the sense of clarity concerning responsibility for innovation and NPD opportunities beyond the core business at Case F. This organisation had set up a new innovation and NPD division just before the research interviews, which influenced the findings.

Case Company	Y	N	Not Asked
A	2	2	3
B	2	1	0
C	1	3	1
D	4	1	0
E	6	0	0
F	8	0	4
G	0	4	0
H	1	9	1
I	0	4	0
J	3	2	1
Totals	27 (51% respondents)	26 (49% respondents)	10

Table 4.16: Cross case findings: Is it clear who is responsible for searching for innovation and NPD opportunities beyond the core business?

4.33 Cross case findings: Effective knowledge management, or other systems, to support innovation and NPD processes beyond the core business

While acknowledging the lower focus on markets beyond the core, the findings regarding the presence of effective knowledge management, or other systems, to support innovation and NPD processes beyond the core business demonstrates a lack of importance given to the sharing of information to support innovation and NPD processes beyond the core business. No respondents from five companies gave positive answers concerning knowledge management beyond the core. Significantly, only one positive answer came from outside the four case companies (Cases A, B, D, E) with a capability rating of over 26 regarding adjacent markets.

Case Company	Y	N	Not Asked
A	4	3	0
B	1	1	1
C	0	4	1
D	4	1	0
E	6	0	0
F	0	9	3
G	0	4	0
H	0	10	1
I	0	3	1
J	1	4	1
	16 (29% respondents)	39(71% respondents)	8

Table 4.17: Cross case findings: Effective knowledge management, or other systems, to support innovation and NPD processes beyond the core business

4.34 Cross case findings: Systematic searching of the periphery of the business environment for innovation and NPD opportunities

Of the 57 managers questioned, only 11 said that their organisation was searching the periphery for innovation and NPD opportunities, and 46 said no. In five organisations, half the sample, no respondents replied positively

Case Company	Y	N	Not Asked
A	3	4	0
B	2	1	0
C	0	4	1
D	3	2	0
E	2	4	0
F	0	8	4
G	0	4	0
H	0	10	1
I	0	4	0
J	1	5	0
Totals	11 (19% respondents)	46 (81% respondents)	6

Table 4.18: Cross case findings: The systematic searching the periphery of the business environment for innovation and NPD opportunities

4.35 Cross case findings: The influence of context on the operationalisation of innovation search and select capabilities in disrupting environments

Table 4.19 below summarises at a meta level the presence of the five contextual factors influencing the operationalisation of search and select within the case companies.

	Innovation portfolio management	Cognition	Ambi-dexterity	Peripheral vision	Rapid change core
A	No clear portfolio matrix Developing adjacent market capabilities Acquisitions used to build portfolio	Attention: Core and adjacent Positive acquisition experience in core and adjacent markets in last 5 years Confident with technology in core markets Staff with extensive core market experience	Established core and emerging adjacent capabilities	Some systematic scanning of the periphery	Competitive in technology “arms race” Activities BTC constrained by operational RCC challenges
B	Clear portfolio matrix and capabilities: core, adjacent and breakthrough Acquisitions used to build portfolio	Attention: Core, adjacent, and breakthrough Positive experience in markets in core, adjacent, and breakthrough in last 5 years, including acquisition Confident with technology across core, adjacent, and breakthrough Staff with extensive core and BTC market experience	Established core and adjacent capabilities Developing breakthrough capabilities	Established structure, capabilities and processes in place to explore periphery	Competitive in technology “arms race” Activities BTC not constrained by operational RCC challenges
C	No clear portfolio matrix Limited adjacent market capabilities Acquisitions build core business	Attention: Core Limited positive experience in adjacent markets in last 5 years The dominant logic in recent years had focused on acquisition and integration Confident with technology in core markets Staff with extensive core market experience. Have brought in OA expertise	Established core capabilities Limited adjacent capabilities	No respondents felt that the organisation had a systematic process to scan the periphery	Competitive in technology “arms race” Activities BTC limited by acquisition integration and related RCC challenges
D	Clear portfolio matrix and capabilities: core, adjacent and breakthrough Acquisitions and investments build portfolio	Attention: Core, adjacent, and breakthrough Positive experience in core, adjacent, and breakthrough markets in last 5 years Confident with technology across core, adjacent, and breakthrough Staff with extensive core and BTC market experience	Established core and adjacent capabilities Developing breakthrough capabilities	Established structure, capabilities and processes in place to explore periphery	Competitive in technology “arms race” Activities BTC not limited by operational RCC challenges
E	Clear portfolio matrix and capabilities: core and adjacent Acquisitions and investments build portfolio	Attention: Core and adjacent Positive experience in adjacent markets in last 5 years Confident with technology in core and adjacent markets	Established core and emerging adjacent capabilities No aspirations to breakthrough capabilities	Some systematic scanning of the periphery	Competitive in technology “arms race” Activities BTC not limited by operational RCC challenges

F	No clear portfolio matrix Developing adjacent market capabilities through acquisition Acquisitions build portfolio in core and adjacent markets	Attention: Core and adjacent Positive acquisition experience in adjacent markets in last 5 years Not confident with core technology Staff with extensive core market experience	Catching up with core capabilities New capabilities in acquired firm No aspirations to breakthrough capabilities	No respondents felt that the organisation had a systematic process to scan the periphery	Catching up in technology “arms race” Activities BTC were limited by operational RCC challenges
G	No clear portfolio matrix Developing adjacent market capabilities University Press: No acquisition or investment option	Attention: Core and adjacent Positive experience in adjacent markets in last 5 years Staff with extensive core market experience	Established core capabilities Emerging adjacent capabilities No aspirations to breakthrough capabilities	No respondents felt that the organisation had a systematic process to scan the periphery	Competitive in technology “arms race” Activities BTC were limited by operational RCC challenges
H	No clear portfolio matrix No adjacent market capabilities University Press: No acquisition or investment option	Attention: Core No experience in adjacent markets in last 5 years Staff with extensive core market experience	Catching up with core capabilities No adjacent capabilities. No aspirations to breakthrough capabilities	No respondents felt that the organisation had a systematic process to scan the periphery	Catching up in technology “arms race” Activities BTC were limited by operational RCC challenges
I	No clear portfolio matrix Developing adjacent market capabilities Scholarly Society: No acquisition or investment option	Attention: Core and adjacent Positive experience in adjacent markets in last 5 years Confident with core technology Staff with extensive core market experience	Established core capabilities Emerging adjacent capabilities No aspirations to breakthrough capabilities	No respondents felt that the organisation had a systematic process to scan the periphery	Competitive in technology “arms race” Activities BTC were limited by operational RCC challenges
J	No clear portfolio matrix Developing adjacent market capabilities Scholarly Society: No acquisition or external investment option	Attention: Core and adjacent Positive experience in adjacent markets in last 5 years Confident with technology in core and adjacent markets Staff with extensive core market experience	Established core capabilities Emerging adjacent capabilities No aspirations to breakthrough capabilities	Some limited systematic scanning of the periphery	Competitive in technology “arms race” Activities BTC were limited by operational RCC challenges

Table 4.19: Presence of the five contextual factors influencing the operationalisation of search and select

4.36 Bringing the findings together

The research process generated significant amounts of data, and some intriguing findings. In an era of data overload, part of the role of the effective researcher is to portray information that causes others to understand the implications of the findings for others. The most important findings are that out of a sample of 10 incumbent organisations with an average of 178 years of experience competing in HE publishing markets in disrupting environments:

- Five had strong capabilities in innovation search and select in core markets
- Four of these five had strong capabilities in innovation search and select in adjacent markets
- Two had strong capabilities in innovation search and select in breakthrough environments

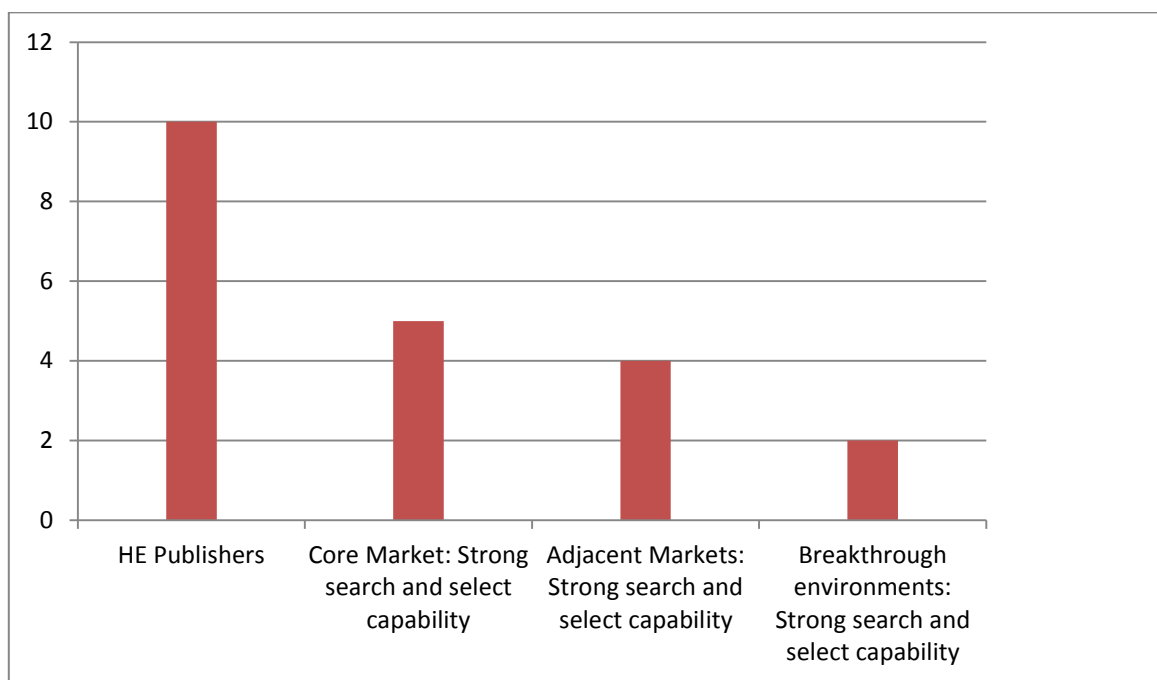


Table 4.20: Summary table: Out of 10 case companies, how many revealed strong capabilities in innovation search and select across core, adjacent and breakthrough environments?

- Only 11(19%) out of 57 respondents who answered said that their organisation was searching the periphery for innovation and NPD opportunities, and 46 (81%) said no
- Under 30% of the respondents who ventured an opinion indicated the presence of effective knowledge management, or other systems, to support innovation and NPD processes either in the core business, or beyond the core business. This demonstrated a lack of importance given to the sharing of information to support innovation and NPD processes across the core and wider business.

4.37 Two publishers demonstrated search and select capabilities in breakthrough environments, and eight did not

In breakthrough environments, the distribution of search and select capabilities was starkly differentiated. Cases B and D both achieved a capability rating of 33 out of 33, while the third most capable firm, case A, secured a capability rating of 9 out of 33.

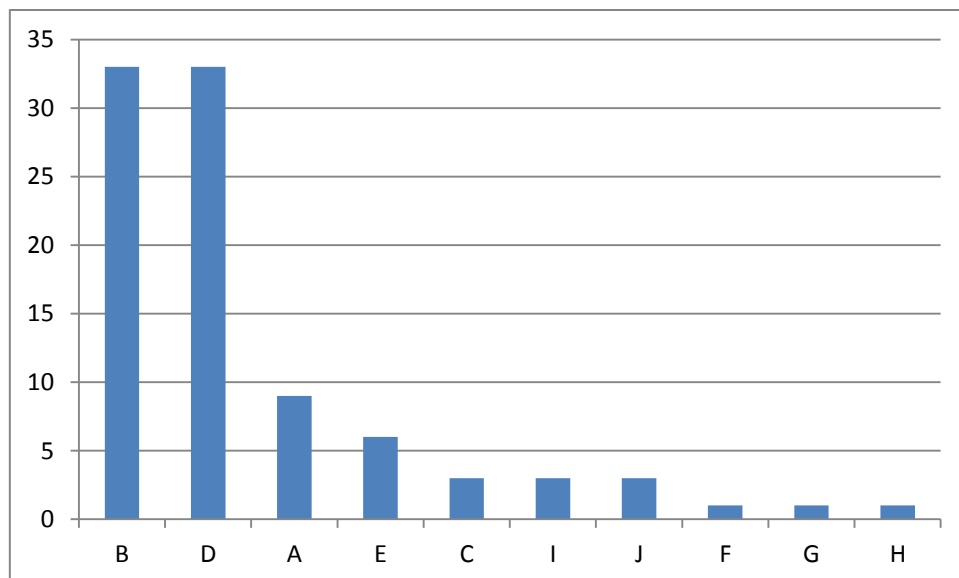


Table 4.21: The distribution of search and select capabilities in breakthrough environments

4.38 Findings summary

Having established an extensive range of findings, the next chapter will discuss them at both the individual case level, and at the cross-case level.

CHAPTER 5: DISCUSSION

5.1 Introduction

This chapter discusses the findings in relation to the existing literature, which suggests that organisations need a range of capabilities to manage search and select in disrupting environments, in multiple business settings. The literature review identified that organisations operating in disrupting environments require 11 dynamic capabilities, defined as: “The ability of an organisation and its management to integrate, build and reconfigure internal and external competencies to address rapidly changing environments” (Teece, Pisano, & Shuen, 1997, p. 516), to manage NPD search and select in core, adjacent and breakthrough environments. The capabilities were distributed in different ways across the case companies.

In disrupting environments, organisations need to explore adjacent and more peripheral opportunities, as they look beyond the core for growth. All the case companies understood the need to develop and manage a portfolio of opportunities, and recognised the demands of the rapid change core. Appropriate structures were required to identify, validate and develop the portfolio, supported by activities and processes within each part of the structure, and a range of people and skills to make each part of the structure successful. The challenge is that organisations have to look across a spectrum of opportunities at the same time.

5.1.1 How do publishers operate beyond the rapid change core?

As we would expect from the innovation portfolio literature, the research revealed that the capabilities required to operate beyond the rapid change core were well established in certain organisations, and not present in others, with innovation work ranging from scholarly publishers targeting previously unserved users, e.g. undergraduates instead of academics and postgraduates, to the pursuit of opportunities further from the core such as video products and workflow solutions for researchers.

There was a marked divide between the organisations capable of developing their offering to include technology dependent workflow orientated solutions alongside more conventional products and services, and the organisations primarily focused on conventional publishing products targeting traditional HE budgets.

Discussion about NPD beyond the core saw informants repeatedly referring to the constraints limiting innovation in adjacent or breakthrough environments. The core business was found to be demanding, particularly in terms of an organisation's technology capability, as competition to increase the visibility of online content was intense. The phrase "rapid change core" acknowledges that digitally enabled organisations can be stretched by operational demands in their core business. When organisations struggle to keep up in the rapid change core, they find it difficult to develop and operationalise a balanced innovation portfolio.

The two most progressive large publishers were confident in building new propositions for emerging user problems exploiting data analytics, across core, adjacent and breakthrough environments.

5.1.2 Discussion chapter structure

The "in case" and "cross case" analysis generated insights at the case level, and at the level of the HE publishing sector regarding the operationalisation of search & select in disrupting environments. The discussion chapter will consider the relationship between the literature and the findings to:

- Analyse the presence in each case company of the 11 search and select capabilities identified through the literature review as being most relevant to the HE publishing industry across core, adjacent and breakthrough environments
- Consider the influence of five key contextual themes on the operationalisation of innovation search and select capabilities in disrupting environments
- Propose a nine step modified version of Day and Schoemaker's process: "Seven steps to bridge the vigilance gap"

- Propose a scoping framework guiding organisations on where to look for NPD opportunities when mapping their search and select activities in digital environments
- Propose a conceptual model identifying ten key market insights that inform NPD, detailing the key market information required by organisations to develop new offerings in HE publishing environments

5.2 Case A: Large commercial publisher

Introduction

Case A had taken the decision to look beyond the core, setting up a division to take this work forwards. The firm was numbers driven, slightly risk averse, and accustomed to incremental innovation. The impulse to invest in and progress innovation activities in adjacent areas, enabled through search and select routines, had only gained momentum as sales slowed in the core.

The overall search and select capability ratings were 28 out of 30 in core markets, 26 out of 30 in adjacent markets, and 9 out of 33 in breakthrough environments.

In case analysis

Even though Case A was connected with HE stakeholders, and understood the slowdown in the growth of key budgets, it took slowing sales to trigger initiatives focused on adjacent markets. As Christensen (1997) found, organisations challenged with disruption frequently do not have problems developing the right technology to respond, but: “Sustaining projects addressing the needs of the firm’s most powerful customers almost always pre-empted resources from disruptive technologies with small markets and poorly defined customer needs” (Christensen, 1997, p.41-42). While a perception of threat can overcome inertia (Huff, Huff, & Thomas, 1992; Lant, Milliken, & Batra, 1992), other research shows that threat can limit the range of alternatives organisation leaders are willing to consider, and that the degree of experimentation reduces (Ross & Staw, 1993).

There was a tension at Case A between the core business, which was evaluated internally using well recognised measures and favoured predictable outcomes, and projects in more uncertain environments. However companies need substantial innovations to boost profits, with one study showing that while only 14% of new product launches were substantial innovations, they made up 61% of all the profits from innovations among the companies examined (Kim & Mauborgne, 1999).

Companies with the strongest innovation track records manage a balance of innovation activities across core, adjacent and breakthrough (or transformational) initiatives (Cooper, 2013; Nagji & Tuff, 2012; Radjou & Prabhu, 2015). A range of discontinuities exist which cause organisations to move “beyond the steady state” of core markets, to look for and validate new opportunities (Phillips, Noke, & Bessant, 2006). Case A had recently developed the capabilities required to search for opportunities in adjacent markets, as the firm had recognised that its financial growth objectives could not be met from core markets, and that it needed to identify, select and follow through on a range of opportunities. The recognition of the need to develop significant businesses beyond the core is an essential precursor to firms engaging with innovation search activity outside well established markets. The importance of this recognition step needs to be taken into account when developing a model summarising how organisations can best manage search and select in disrupting environments. However, the capability had only started to develop at Case A in the 12-15 months before the interviews, through the creation of a new division actively considering opportunities in adjacent markets. The stage-gate process to manage search and select in adjacent areas had only been developed at the firm in the 12-18 month period before the interviews. The development of relationships with the funders of research had increased in the previous three years.

Day and Schoemaker (2004, p. 117) wrote: “In a world in which changes come from many different directions, the ability to balance organisational focus with the wide-angle view may be the most important ability for long-term survival and success.” Growth had slowed in the core, and Case A had responded in accordance with Day and Schoemaker’s observations above, initiating search activities by internal staff in

breakthrough environments, but concluding that the research workflow opportunities being pursued by other organisations were “nascent”. After an initial foray into searching the periphery, Case A’s preference for adjacent environments for internally driven exploration was evident, consistent with the slightly risk averse culture of the organisation, confirming the literature on organisational inertia (Gilbert, 2005; Tripsas & Gavetti, 2000; Utterback & Suárez, 1993).

The executive leadership team had supported the exploration of adjacent sectors through acquisition, with an interviewee observing: “There was the recognition that we weren’t going to be able to innovate internally across the board and organically, which is why (Case A) actively went out there and started acquiring companies, so actually I think the executive leadership thought that the fastest way to a successful outcome was not to try and do this internally, but to actually buy in that expertise, and have it bought in with associated revenues and customers, because there was also the recognition that building this stuff from the ground up is actually very difficult, very time consuming and that we may not have all of the requisite skills.”

Organisations have to develop their core operations, otherwise they will lose their competitive position and profit streams (Brown & Eisenhardt, 1997). Case A had the capabilities and routines to make the right choices to sustain performance in core markets that were changing fast, through product development and acquisition activity, and they were not in the grip of the rapid change core. The interviewees recognised the need to assess what opportunities stay with the core (e.g. OA), and which ones should be developed by the group responsible for adjacent markets.

As firms seek a “market focused, agile R&D model” (Radjou & Prabhu, 2015, p.26), Case A sought pervasive problems following the “jobs-to-be-done” theory of market segmentation (Christensen et al., 2004; Ulwick, 2005), and focused on generating the data to evaluate whether their MPVs solve them (Furr & Dyer, 2014; Morris, Ma, & Wu, 2014, p. 138). With activity beyond the core still relatively new in some divisions, the technical and cognitive capability to interpret the data from unfamiliar markets and stakeholders needed to be developed further. The culture was driven by numbers, and the organisation was slightly risk averse, making agile product development processes more difficult to embed. There was a tension between the

core business, which was typically evaluated using well recognised measures and predictable outcomes, and projects in more uncertain environments (Christensen, 1997, p.42-43).

Innovation activities targeting educational opportunities in adjacent markets appeared relatively well developed. Educational products were focused on supporting the learning workflow, and this content and technology mix displayed more of a solutions approach than products targeting Company A's research driven stakeholders. A solutions approach blurs the lines between core and adjacent markets.

An initial exploration period had considered adjacent and peripheral opportunities, but the organisation had found that these market sizing activities were difficult, as they could not identify tangible and achievable opportunities in more peripheral areas. Case A appeared to have decided to focus exploratory search and select activity on adjacent areas, adopting a "make-and-sell" approach where searching the periphery could be added to the list of "unnatural acts", rather than acting as a "sense-and-respond" organisation (Haeckel, 2004, 2008, p. 16).

Gilbert (2005) emphasises that incumbents face the dual challenges of resource rigidity (Christensen & Bower, 1996; Noda & Bower, 1996), and routine rigidity (Feldman & Pentland, 2003; Winter & Nelson, 1982), when it comes to overcoming the organisational inertia that so often sustains the focus on the core business (Teece et al., 1997; Tushman & Anderson, 1986). To overcome organisational inertia the executive leadership of Case A established a division to look beyond the core, designing the organisation to develop a portfolio of options (Day, 2007; McGrath, 1997) across core and adjacent markets.

5.2.1 What is the influence of context on the operationalisation of search and select?

Innovation portfolio management: Case A did not have a clear matrix or device to communicate priorities and structured approaches to adjacent markets, or breakthrough environments.

The organisation used acquisition to buy in new capabilities, as well as market position, in new sectors identified as offering growth potential. The use of company acquisition to increase revenues, and bring new skills, knowledge and processes into the firm gave the board significant options when it came to developing a portfolio of innovation options: “We tend to evolve through M&A activity at (the company). I would say almost exclusively so, when we bring a new product on board or we add major technology capability that’s not in the core, it’s almost always through a partnership or acquisition.”

The alignment of market focused strategy processes with technology strategy was identified as having a particularly large influence on exploiting emerging opportunities, supporting the literature arguing that innovation strategy and technology strategy are intertwined (Tripsas & Kaplan, 2008).

Cognition: Case A’s respondents were highly experienced, with the longest average length of service with their employer as compared to the other large companies. With such long service in the core business, which had grown through acquisition and incremental change, the interviewees faced learning challenges in equipping themselves to become effective at innovation beyond the core. The informants commented on the need to transform their own cognitive frames, to support the identification and pursuit of different types of problems and solutions than those to which they were accustomed (Benner & Tripsas, 2012; Kaplan, 2008b; Tripsas & Gavetti, 2000).

Ambidexterity: The development of ambidextrous management approaches (Birkinshaw & Gupta, 2013; Tushman & O'Reilly, 1996) to run both the core and adjacent search and select processes, and the developing, portfolio business, was a work in progress. At the operational level, Case A had capabilities in place to identify and validate opportunities using stage-gate processes in both core and adjacent markets, despite only embarking on activity beyond the core 18 months or so before the interviews. Challenges existed in managing technology for both the core and emerging opportunities at the same time.

Peripheral vision: Being vigilant to weak signals: Case A had advanced market research capabilities, and was attuned to picking up signals through strategic partners, particularly the scholarly societies. However, the organisation was in the early stages of making sense of signals from peripheral markets (Weick et al., 2005), and the organisation did not appear proactive in recruiting different thinking staff from different backgrounds to make sense of weak signals from unfamiliar environments.

Rapid change core: Case A had up to date technology in place in the core market. However, balancing the technical requirements across the portfolio was a new challenge which was still in need of attention at the time of the research.

5.3 Case B: Large Commercial Publisher

Introduction

The informants from Case B were conscious of the need to manage the innovation process across core, adjacent and breakthrough environments, and the 11 search and select capabilities identified through the literature review firmly were established across their innovation portfolio. They had identified three “zones of opportunity” corresponding with core, adjacent and breakthrough environments, and had created the language and maps to aid decision making. Their organized approach to innovation management had a major and positive influence on the firm’s ability to manage a portfolio of opportunities, and the innovation search and select processes that underpin success. The “three zones of opportunity” strategy approach was

followed through across the company's structure, processes, M&A and knowledge acquisition routines, ensuring that strategy was executed (Kaplan, Norton, & Sher, 2005).

The overall search and select capability ratings were 30 out of 30 in core markets, 30 out of 30 in adjacent markets, and 33 out of 33 in breakthrough environments.

In case analysis

Success in the "old core markets" was built on selling to defined decision making units (DMUs) such as libraries. Success in core, adjacent and breakthrough markets was driven by a user driven, problem solving approach. The focus on users, as well as organisational DMUs, has emerged as a developing theme for B2B researchers (Grönroos, 2011; Vargo & Lusch, 2011), alongside the established field of user driven innovation (Belz & Baumbach, 2010; Kratzer, Lettl, Franke, & Gloor, 2015; Xie et al., 2008).

Case B managed core and adjacent markets together, with a high technology, workflow solution focus, with an interviewee commenting: "It's difficult to know where 'beyond the core' starts and finishes." The firm stopped managing the core market in isolation a number of years ago, recognising that user focused opportunities in adjacent areas were extensions of many of the content and user workflow related problems found in the core (Ko et al., 2009). The company had recognised that content and user workflow were deeply interconnected. In adopting this joined up approach to core and adjacent markets, staff benefited from a clear strategic and tactical approach to managing innovation in core and adjacent areas. The organisation's market research capability equipped it for search activities across the portfolio.

An important element in Case B's search for opportunities was the data centricity of its search approach, supported by user observation. An important objective of innovation in services is to deliver a positive user experience that is frequently highly personalised. The personalisation of services marks a major shift in focus in decision-making from producers to users – even if value capture occurs at the

organisational level. This shift advantages innovators who are able to use technologies that integrate user demands and requirements into the design, delivery, and positive valuation of services by both users (Dodgson & Gann, 2014), and the DMU who select and pay for the service on behalf of an organisation (Adner & Kapoor, 2010; Anderson, Narus, & Wouters, 2006).

Case B managed NPD using a technology intensive approach, with relatively blurred lines between core and adjacent sectors. An interviewee with a technology background explained: “The separation of business and technology is something that we’re consciously disrupting. It still exists but we’re bringing the two halves closer together”, and continued: “Greater tech focus blurs lines.”

The organisation had a managed process to explore adjacent opportunities both geographically, and in terms of identifying adjacent problems and pain points. Market opportunities were being identified and validated. The process was established, rather than being in the early stages of development, giving Case B important operational advantages in managing NPD targeting adjacent opportunities (Eisenhardt, Furr, Bingham, & Eisenhardt, 2010; Kortmann et al., 2014).

Case B had a distinct approach to the search process for breakthrough opportunities, as compared to core and adjacent markets: “It tends to fall to the likes of our senior strategy team to look at the blue sky area, and also our research and development group.” The interviewees knew who was responsible for looking for breakthrough opportunities, and sensed that the company was managing its innovation portfolio proactively, increasing their trust in the firm’s innovation process. Importantly, financial and human resources were being allocated across units to support the strategy (Sull, Homkes, & Sull, 2015).

The company assessed potential “problems to be solved” or “jobs-to-be-done” (Bettencourt & Ulwick, 2008; Ulwick, 2002), and abstracted away from the problems being considered to other sectors, seeking ideas and options.

The faith that the interviewees had in the organisation's technical capabilities gave them the confidence to select opportunities requiring advanced technical capabilities. The alignment of market focused strategy processes with technology strategy was identified as having a particularly large influence on exploiting emerging opportunities. This supports the argument that in digitally enabled markets, innovation capability and technology capability are intertwined (Dodgson, Gann, & Salter, 2005, p.193).

The organisation deployed agile innovation techniques to secure the rapid and ongoing evaluation of MVPs, influenced by the practitioner literature (Ries, 2011, p. 132-135; Morris et al., 2014, p.115-149). Case B's effectiveness in managing a structured, stage-gate driven innovation process in both core and adjacent markets delivered financial returns, allowing the company to focus on breakthrough opportunities beyond core and adjacent environments.

Acquisition was used as a part of the innovation management portfolio by senior management to secure innovation options. The company had a proactive and structured search and selection process in place considering peripheral environments (Day & Schoemaker, 2006), with more peripheral opportunities considered through a central strategic group, as well as the ongoing work of recently acquired organisations operating in peripheral environments. The company was hungry for growth, and was seeking and validating opportunities across the innovation portfolio (Heising, 2012; Spieth & Lerch, 2014).

The organisation looked to learn from other sectors, applying new approaches to existing and emerging opportunities, constantly watching Google, Amazon, Apple et al. and start-ups for new ideas. Case B used analogies during discussion to help transfer insights from similar settings that they have experienced in the past to new environments (Day & Schoemaker, 2005; Gavetti, Levinthal, & Rivkin, 2005).

In an intriguing observation, a respondent stated: "Technology people build 'facts' in different ways ... The winner will be the person that actually creates the fact." Innovation is concerned with future products, technologies and customers (Tellis, 2013, p.115), and radical innovations conceive of a future that is hard to envisage.

The creation of facts to support decisions about future products is an essential part of the innovation selection process.

Incumbents have often built strong positions based on the mastery of a particular technology. Moorman and Miner (1997) found that organisational knowledge and memory about previous or current technologies can hamper innovation. Leonardi (2011) found that individuals who use a particular technology develop cognitive frames through which they view current problems and design alternatives. He also found that different people, from different parts of an organisation, who are used to working with different technologies, are unable to understand why they find it complex to work together, creating complexity when it comes to exploiting useful technologies found in other parts of the organisation, or within acquisitions (Leonardi, 2011).

5.3.1 What is the influence of context on the operationalisation of search and select?

Innovation portfolio management: The recognition of “three zones of opportunity”, and the creation of a language and maps to aid decision making, had a major and positive influence on the organisation’s ability to manage a portfolio of opportunities, and manage the innovation search and select processes.

Cognition: Case B was open to change. The firm acquired different types of business at holding company level, changing the group’s business and product portfolio. Individuals learned from other solution orientated divisions within the group, which kept thinking flexible and opportunity orientated.

The interviewees were highly experienced in businesses beyond Case B, having the lowest average number of years at the company (2.2) and the least years in publishing. Case B recruits non-industry staff to look at problems and opportunities with different lenses, and employs thousands of technology staff, and the three interviewees wanted to learn from the technology experiences of new staff, and technology colleagues in other parts of the business. The fact that the organisation’s HR probation routines were designed to capture relevant ideas and potential

solutions from experiences in other organisations and industries demonstrated an intense interest in ideas from beyond the industry, recognising that individuals can become blinkered by their own organisations and industries (Benner & Tripsas, 2012; Tripsas & Gavetti, 2000).

Once acquisitions have been made in breakthrough areas, bringing in new knowledge and solutions, the management of these businesses was kept independent, to ensure that the newly acquired business unit kept thinking differently, providing solutions to the “jobs-to-be-done” beyond Case B’s core and adjacent environments. Maintaining a distance from the core business was recognised as being important to avoid the high failure rate of corporate venture units (Hill & Birkinshaw, 2012).

Case B identified, validated and acquired companies, bringing new knowledge into the organisation. As a technology intensive firm active in providing information solutions to a wide range of markets, the company was able to draw on significant technology insight and capacity across the business. The main technology approach had moved from outsourcing to insourcing, increasing the internal skills and knowledge that could be applied to innovation projects across the NPD portfolio.

Ambidexterity: The organisation appeared to be organized to support ambidexterity across the innovation portfolio, through its clear structure. The business was experienced at managing different types of high technology dependent businesses across multiple sectors.

Peripheral vision: The organisation was prepared to use open ended questions that draw imprecise but valuable lessons from the periphery. This was demonstrated through a data centric approach on one side, and the discipline of learning from new recruits on the other.

Rapid change core: Case B managed the rapid change core effectively, and was therefore able to turn its attention to the development of its innovation portfolio beyond the core.

5.4 Case C: Large commercial publisher

Introduction

Case C had grown strongly and profitably in recent years in core markets, and the respondents explained that the organisation had not had a financial need to explore adjacent or breakthrough markets. The organisation was heavily engaged in acquiring and integrating other publishers, with the content sold to traditional DMUs. This activity had left little time for projects beyond the core. The core market had consistently delivered strong financial growth, so the organisational view was that there was little need to embrace innovation activities beyond acquisition and sustaining innovation. The company's overall capability "rating" in adjacent markets was boosted by the OA division. The organisation had deep contextual understanding, and collaborated effectively with external organisations such as long-term commercial partners e.g. scholarly societies.

The overall search and select capability ratings were 24 out of 30 in core markets, 14 out of 30 in adjacent markets, and 3 out of 33 in breakthrough environments.

In case analysis

The firm's innovation activities were sustaining in nature, focused on incremental innovation (Christensen, Johnson, & Rigby, 2002; Utterback & Abernathy, 1975), working with existing partners and customers in the core market. Geographic expansion had been prioritised. The decision had not been made to look beyond the core in a systematic way.

Case C consciously avoided opportunities beyond the core, apart from the new business models connected to OA, as there was little senior level interest in exploring wider opportunities, supporting the literature on the influence of senior level cognitive frames on strategy development (Eggers & Kaplan, 2009), with career gain and reward in prospect from success in the core business, rather than through exploring beyond the core.

The OA division was focused on developing new business models, and solving the problems faced by authors and users (Chatterji & Fabrizio, 2012, 2013), and the responses from this division boosted the capability ranking of the overall publisher significantly when considering the capabilities needed to search for and select innovation opportunities in adjacent markets. The existence of the OA division demonstrated that senior management recognised that different skills and routines were needed to succeed in the changing publishing industry in the core and adjacent markets, although it was not clear if the creation of the division was to defend the core, or to create new opportunities. The division used multiple methods to scan beyond the core (Day & Schoemaker, 2006, p. 49-72), watching competitors, and learning from other technology enabled sectors. The organisation had no activities to explore peripheral environments, as it had no interest in exploring breakthrough environments.

Excepting the OA division, the organisation's great success in the core market and the resultant lack of priority given to activity beyond the core limited the firm's capability to search for and validate innovation opportunities in adjacent and breakthrough environments, with core strengths having become core rigidities (Leonard-Barton, 1992). The organisation had no activities to explore breakthrough environments, as it had no interest in exploring them.

The selection of opportunities for sustaining innovation was driven by the need to acquire, integrate and sell content, while building customer loyalty at the same time (Jong & Dijk, 2015; Kumar & Reinartz, 2002; Reichheld, 2011). Resource allocation was prioritised towards existing customers (Christensen, 1997, p. 42-43).

Case C was well informed about customer needs in the core market, but the focus was primarily on the customer's DMU, rather than on the users of their products (Grönroos, 2011). The planning processes focused on traditional content priorities, rather than interpreting data concerning user behaviour (Kratzer et al., 2015; Rowlands et al., 2008).

5.4.1 What is the influence of context on the operationalisation of search and select?

What disrupts incumbent firms in Christensen's story (1997) is not the inability of organisations to conceive of disruptive technology. Like Amit and Zott (2012), he identified the root of the tension in disruptive innovation as the conflict between the business model already established for existing technology, and the business model(s) required to exploit emerging technologies (Chesbrough, 2010). The "dominant logic" (Prahalad & Bettis, 1986, 1995) of an organisation guides the information that it seeks. An organisation seeks data which fits with its dominant logic, and avoids information which conflicts with it (Chesbrough, 2010). The dominant logic of Case C was the highly profitable acquisition policy, which had limited the search for other business opportunities, and negated the need to probe and learn regarding alternative opportunities (Lynn, Morone, & Paulson, 1996; Phillips et al., 2006).

The disruptive impact of acquisition on the acquirer is well established (Hitt et al., 1991, 1996), with acquisition reducing the internal financial and human resources that can be dedicated to innovation activities without the development of a structured innovation portfolio (Day, 2007), balanced resource allocation (Klingebiel & Rammer, 2014), and effective project management across the portfolio (Killen & Hunt, 2013).

Innovation portfolio management: Case C had adopted a "Wait and see" approach to adjacent and breakthrough environments. With growth having come reliably from the core market, there had been little impulse to design or operationalise an innovation portfolio driven organisation.

Cognition: The attention of Case C had primarily been on acquisition, integration, keeping up with technology in the rapid change core and sales activities in core markets. The organisation was particularly strong in the HASS (humanities and social sciences) subject areas, which had been less disrupted than some other firms by the new publishing and dissemination models supported by advocates of open access to research information, and the funders of STM research. It was likely that this

relatively late exposure to the practical threat of different business models slowed the organisation's response to OA business models either defensively, or in terms of developing new options. The organisation had responded through setting up an OA division. However, the cognitive frames of the organisation at both the strategy and operational level were limited by the demands of the rapid change core. The quotes were telling: "We're quite conservative. We like the core business", and "There are certainly opportunities that come up that are outside the core business, but people get very uncomfortable very quickly."

Ambidexterity: Beyond the new OA division, there were no signs of strategic ambidexterity, such as creating separate structures for different types of activity in the core and beyond the core (Birkinshaw & Gibson, 2004; Reeves et al., 2015, p. 175-179). In fast moving high technology environments the tensions between exploration and exploitation occur within core markets, as well as across a portfolio of uncertainty further from the core (Chandrasekaran, Linderman, & Schroeder, 2012). Case C encountered ambidexterity challenges within the core business between established and newly acquired businesses requiring integration, alongside the demands of keeping up with the technology requirements of a rapidly evolving sector.

Peripheral vision: Case C was not looking beyond core markets, influenced by the dominant logic of the core business, and the acquisition, integration and commercialisation routines that had delivered profitability in the core over many years.

Rapid change core: The meetings with Case C intensified the researcher's reflections on the rapid change core. Publishing firms had to keep up with the "technology arms race". They also had to keep up with the operational demands of integrating new acquisitions across the value chain. A respondent noted: "The innovation side of development takes second place to the project work around acquisition, so large acquisitions have quite an impact on our ability to take forward new projects", reflecting the disruptive internal impact of acquisition on the capacity of the organisation to innovate (Ahuja & Novelli, 2014). The organisation was heavily engaged in acquiring and integrating traditional, content driven publishers, with the

content sold to traditional DMUs. This activity left little time and gave a low priority to projects beyond the core.

5.5 Case D: Large commercial publisher

Introduction

The 11 innovation search and select capabilities were well established across the core, adjacent and breakthrough divisions of Case D. A three colour coded matrix was central to how the organisation designed and operationalised its opportunity portfolio, influencing the skills most valued in different divisions.

The organisation displayed an exploratory mind set, which freed up staff operating in adjacent and breakthrough environments to explore widely, with a respondent explaining: “The organisation is built around innovation, and particularly our approach to technological innovation.” The respondent continued: “We don’t think publishing is about publications primarily, we think it’s about information, and when you see things that way your view switches. You see many more opportunities afforded by new digital and network technologies.”

The overall search and select capability ratings were 29 out of 30 in core markets, 29 out of 30 in adjacent markets, and 33 out of 33 in breakthrough environments.

In case analysis

Case D had started to explore the periphery systematically a number of years ago, and had established a very structured approach to innovation portfolio management across core, adjacent and breakthrough opportunities.

The company used up to date search techniques to ensure that their core market product range maintained the brand’s reputation as a leading platform. With incremental product development managed successfully in the core, supported by strong technology skills across the organisation, the firm had maintained growth in the core. The sense of control and confidence in the rapid change core enabled the

organisation to turn its attention to growth in both the adjacent and breakthrough areas.

The organisation had processes in place to explore adjacent opportunities in terms of identifying adjacent problems and pain points: “Solving problems within the workflow, so we do very detailed workflow analysis.” The firm exploited close connections with the market place through digital usage based data analysis (Chen & Storey, 2012; Rowlands, Nicholas, Williams, & Brown, 2011), ethnographic analysis of researcher (user) workflows (Chen & Venkatesh, 2013; Kozinets, 2002; Rowlands, Nicholas, Russell, Canty, & Watkinson, 2011), and strong connections to the evolving HE publishing and research environment (Vargo & Lusch, 2011). Market opportunities had been identified and validated. The process was well established, rather than being in the early stages of development, giving Case D important operational advantages (Kortmann et al., 2014).

Hill and Birkinshaw (2008) identified a range of corporate venture unit approaches to explore opportunities, and Case D had adopted the “internal explorer” approach for adjacent markets. The firm had experimented with both “internal explorer” and “external explorer” units in peripheral environments (Hill & Birkinshaw, 2008), and had found that the “external explorer” approach was more effective for breakthrough opportunities.

Case D had found that the entrepreneurial routines, disciplines and lean start-up approaches advocated by Ries (2011), and the instincts of smaller, stakeholder immersed organisations, were effective in identifying opportunities in the periphery. Analysis of Case D raised the question as to whether effective innovation in breakthrough environments is best served by “internal explorer” units, acquisition, or solution development through “external explorer” incubator type organisations (Hill & Birkinshaw, 2008).

The company had a very “fact based” approach, seeking the insights upon which they could make informed decisions, and this approach was enabled by the deployment of agile (Morris et al., 2014, p. 93) ideation processes supported by the discipline of MVP validation routines (Morris et al., 2014, p.132; Ries, 2011, p. 158).

Through making the right decisions in the rapid change core, the organisation was able to turn its attention to adjacent and breakthrough opportunities.

The firm had established an effective, data driven, problem focused approach to identifying and validating opportunities in adjacent areas (Christensen, Anthony, Berstell, & Nitterhouse, 2007; Westerman, Bonnet, & McAfee, 2014). The adjacent focused division looked for ways to support researchers (users) in their work, with an interviewee observing: “Workflow solutions are a huge part of it, but it's also about extending a space in which we operate.” While content mattered, the interview commentary often focused on problem solving: “It’s all about making sure that we understand and deliver the need. What else is important?”

Case D could articulate internally and externally the problems that they aim to solve for users and the research community, which the informants believed put them ahead of their competitors: “You really require deep domain expertise to access this area, and if you lack dedicated domain expertise which is being put behind a particular project, it will usually fail.” The “probe and learn” validation process (Lynn et al., 1996; Phillips et al., 2006) involves working with users on constantly evolving “beta” versions of products, generating data that helps with both concept validation and the improvement of the product offering. Case D was very focused on securing data from users: “One of the important things to us is not just that we have lots of products to generate revenue and it’s used by lots of users, but that we gather lots of useful or potentially useful information”, which supports the literature on the importance of digitally centred and data informed product development (Belz & Baumbach, 2010; Westerman et al., 2014).

Case D had become an expert in developing, testing and validating new business models, particularly concerning value capture, because their network of incubator companies were developing new solutions for newly identified jobs-to-be-done, and they were targeting unfamiliar, or newly emerging budgets. They aimed to be expert in capturing data from users, and the stakeholders engaged with the problems or jobs-to-be done where they sought to offer solutions (Kiron et al., 2014; Ries, 2011; Westerman et al., 2014).

An interviewee connected with the breakthrough business explained that when selecting future partner organisations for investment: “We are looking for people with deep domain expertise. We are not interested in people who are trying to make a quick buck. We look for people who have a similar value system to us, who are in it for the research not the money. We look at people who add something distinctive to the collection: a different approach, a different style of doing business.” The focus on different types of people, with different skills appropriate for developing breakthrough opportunities, supports the literature considering the structures and capabilities required to explore “beyond the steady state” (Bessant et al., 2005a).

5.5.1 What is the influence of context on the operationalisation of search and select?

Innovation portfolio management: The organisation had a clear strategic imperative and structure to enable the exploration of a portfolio of options beyond the core, across adjacent and breakthrough environments. This was communicated through the simply structured three colour coded portfolio matrix, supporting the positive influence of a clearly communicated approach to innovation portfolio management (Day, 2007; Nagji & Tuff, 2012; Reeves et al., 2015). Case D supported the importance of creating “real options” (McGrath, 1997), and emphasised the critical role of decision making to take advantage of the options being developed through the search and select phases (Adner, 2007; Barnett, 2008).

Cognition: The greater the technology focus, the less the organisation is bound by industry perspectives, and Case D’s confident approach to technology influenced the search and validation processes: “If you are going to be in the information business, and we live in the information age and the information technology driven age, you need to get really good with software and data, which redefines what it means to be a publisher, in terms of information and in terms of information technology.”

There was little that was tentative about the engagement of the interviewees in their markets: “It is important to us to be a part of the research ecosystem and to support it positively.” The strategy emphasised purposeful exploration, which affected the

cognitive frames of staff, supporting the literature on the influence of cognition on managerial activity (Cho & Hambrick, 2006; Eggers & Kaplan, 2013; Kaplan, 2008a). Case D took a long term view when building for success in adjacent and breakthrough environments, particularly when operating in more peripheral spaces.

Ambidexterity: Reeves et al. (2015, p. 175) define ambidexterity as: “The ability to apply multiple approaches to strategy at any given time or successively”, and in embracing the innovation portfolio approach, Case D had taken on the demands of managing a more complex set of activities than if it had chosen to stay in the core, or had restricted its plans to operating only in core and adjacent markets. The organisation’s approach to simplifying its ambidexterity challenge was through a clear structural separation of responsibilities across the innovation portfolio, communicated through the three colour coded portfolio matrix approach.

Peripheral vision: Case D understood the importance of searching the periphery, as advocated by the literature (Day & Schoemaker, 2006), as well as the need to make sense of weak signals. However, even though they had operationalised search and select in peripheral environments, only three out of the five respondents felt that the publisher had a systematic way of searching the periphery of the business environment for innovation and NPD opportunities. The wider the search process, the greater the volume of knowledge that needs to be managed within the firm (Schoemaker et al., 2013), and the view of the respondents was that knowledge management systems were stronger beyond the core than in the core. This presents a challenge to the organisation, as it needs to harvest innovation insights from the core to the periphery.

Rapid change core: The interviewees all had great confidence in the management of the core business, so concerns over the rapid change core did not limit the management of search and select in adjacent and breakthrough environments.

5.6 Case E: Medium sized commercial publisher

Introduction

The 11 innovation search and select capabilities were consistently well established across the core and adjacent activities of Case E. However, having considered the potential rewards in breakthrough environments, the firm had decided not to pursue options in highly uncertain spaces, and had chosen to focus on both core and adjacent opportunities. The firm had a clear innovation portfolio management structure, with a six-box matrix referred to throughout the interviews. Case E follows a “Fast Second” strategy (Markides & Geroski, 2004, 2005), relying on operational excellence to beat competitors in the core and adjacent sectors.

Case E was accustomed to strong growth. However, the board had decided that future growth must come from both the core, and beyond the core, as they were concerned about: “Disintermediation, and systemic displacement by a change in models.”

The overall search and select capability ratings were 27 out of 30 in core markets, 26 out of 30 in adjacent markets, and 6 out of 33 in breakthrough environments.

In case analysis

The core business was supported by strong technology management, which facilitated continued acquisition and success in the core market, allowing the organisation to explore adjacent opportunities.

The six-box matrix innovation portfolio guided the innovation search and select processes, defining the scope of where Case E looked for opportunities, i.e. in core and adjacent markets, but not in more peripheral breakthrough environments. The organisation had also taken the view that it was a content focused publisher: “Ultimately there is a difference between a content based product, where the content is the play, versus selling a service” as: “Service provision is more easily displaceable.”

The managers responsible for new and emerging opportunities deployed advanced market research processes to understand the “jobs-to-be-done” (Christensen et al., 2007; Eyring, Johnson, & Nair, 2011; Radjou & Prabhu, 2015) in the workflow of the teachers, researchers and students that they were targeting. Case E recognised that their content based problem solving solutions had to work logically within the workflow of stakeholders, but they did not seek to provide end-to-end, software enabled workflow solutions.

Case E had a strong market research culture, and had established search and select processes. The organisation had strong knowledge management systems, and the robust planning cycle was supported by the availability of senior “vigilant” leaders, enabling balanced data interpretation.

In HE markets, the adoption of new technology such as social media and publisher databases is more advanced in STM subjects than in HASS (Rowlands, Nicholas, Russell, et al., 2011). Case E had grown from a primary focus on the social sciences to a wider subject mix, and had been successful in transferring successful moves made by STM publishers, and had applied learning from the STM market segment to the social sciences. Through being watchful of developments by competitors, and with extensive connections with scholarly societies and HE stakeholders, they had confidence in their Fast Second (Markides & Geroski, 2004, 2005) approach, and in their strategic and operational capabilities to do so.

The decision not to pursue opportunities in breakthrough environments was felt to liberate the organisation from distractions. Case E could identify and pursue emerging opportunities once they were gaining traction in the wider HE publishing sector, taking away the need to plan for breakthrough opportunities. The quality of structured innovation portfolio governance enables higher levels of portfolio innovativeness across both market performance and technological aspects (Urhahn & Spieth, 2014). Effective innovation portfolio management is not just driven by the breadth of the options being pursued, but through the selectivity of resource allocation at the later stages of the innovation process (Klingebiel & Rammer, 2014).

A key step in Case E's probe and learn process was to consider whether the best way of delivering a solution to an opportunity was to build, buy, or partner? These terms were regularly referred to by the interviewees, as a part of an effective ambidextrous approach to core and adjacent product development.

Case E had established search and select capabilities. They had designed the organisation to develop a portfolio of options (Cooper, 2013; McGrath, 1997). The firm was operationalising the portfolio organisation through structured planning, with autonomy given to the individuals developing new products in core and adjacent markets.

5.6.1 What is the influence of context on the operationalisation of search and select capabilities?

Innovation portfolio management: Case E had set up a highly structured six-box matrix to manage their innovation portfolio, covering core, adjacent and breakthrough opportunities (Day, 2007; McGrath & MacMillan, 2009a). They had chosen to explore only four of the six boxes, placing uncertain opportunities in breakthrough environments in the two peripheral boxes where they do not want to operate.

Cognition: The attention of the firm had moved from the core, to include adjacent markets, and a clear communication plan had ensured that the cognitive frames of the managers at the operational level included both core and adjacent opportunities (Collis & Rukstad, 2008). Case E's success here supports the importance of the attention-based theory of the firm (Barnett, 2008; Ocasio, 1997; Ramírez, Österman, & Grönquist, 2013).

Ambidexterity: The growth of the organisation had demanded ambidexterity to enable the acquisition and integration of other companies in new subject areas, while sustaining commercial momentum in core markets. Case E demonstrated the ambidexterity to select different strategies for different markets and opportunities at the strategic and operational level, as highlighted in the literature (Reeves et al.,

2015; Tushman & O'Reilly, 2011). Acquisition is a key tool deployed in the development of the portfolio in the core, and beyond the core, the management of which also demands ambidexterity and appropriate resource allocation (Sull et al., 2015).

Peripheral vision: Case E was a vigilant organisation, sensing and acting on early warning signs of new opportunities in core and adjacent markets. Even though the organisation's innovation portfolio excluded high risk peripheral opportunities, the firm was focused externally, applied strategic foresight and encouraged exploration (Day & Schoemaker, 2008).

Rapid change core: The company had robust processes in the core, and was keeping up with the platform technology arms race. Systematic planning routines sustained the performance of the core, enabling the organisation to drive search and select processes in adjacent markets.

5.7 Case F: Medium sized commercial publisher

Introduction

Case F did not appear to have a clear and effectively communicated plan for the core business in terms of the development of new products, and the overall search and select capability ratings were 21 out of 30 in core markets, 16 out of 30 in adjacent markets, and 1 out of 33 in breakthrough environments.

The need for improved operational effectiveness pervaded the interview process (Kortmann et al., 2014). Extensive operational improvement plans were in place, which were being actualised at the time of the research. The firm had just finished migrating its product platform to a new provider at the time of the interviews, and many operational improvements were in prospect following this highly demanding, multi-year process. This was a business in the grip of the rapid change core.

In case analysis

The firm had decided to look beyond the core, demonstrated by the recent creation of an innovation group targeting opportunities in core and adjacent markets. In addition, the company was ready to identify acquisitions beyond the core, and the strongest capability ratings identified were regarding acquisition identification and follow through in both core and adjacent markets.

The company did not have structured search and select processes in place for core and adjacent markets, so the scoping of where to look, and how to look, was in progress at the time of the interviews. The innovation group had only been set up relatively recently, and discussions centred on what “should be happening in the future”, rather than on what was actually in place. Interviewees talked about pain points, and identifying problems to be solved, but the processes were not in place to do so. The organisation’s weakness in terms of user understanding limited their ability to understand user and author workflows, particularly in the key North American market. The lack of lead user understanding limits innovation options (Mahr & Lievens, 2012; von Hippel, 1986; Xie et al., 2008). While the interviewees were highly informed about what competitors were doing, this was linked to the need to catch up with more technologically advanced competitors in terms of core products. An interviewee commented: “(We) have not done a lot yet to develop new solutions, so we are in the R&D phase. More of the R phase than the D phase actually.” The firm had also pursued a collaboration project with an external partner. Collaboration with partners and acquisitions beyond the core happened on an irregular project basis, rather than on a structured portfolio basis.

Connections with external stakeholders beyond individuals involved in the buying DMU were limited, reducing insights for the core business (Adner, 2006; Håkansson, 1982, p.32). The adjacent market company within the group appeared to be connected to a wider range of stakeholders than the core operation.

The firm had close commercial connections with its customers. Only limited data had been collected from stakeholders in the core business beyond tracking studies. The focus was more on addressing the needs of customers, rather than on NPD targeting disruptive technologies or users in emerging environments, echoing the findings of Christensen reported in the Innovator's Dilemma regarding the constraining influence of existing customers (1997, p. 43).

The organisation was focused on internal change programmes. The strong external links required to support product development that were in place in the core market were with suppliers and customers, not with industry bodies, users or funders, with an interviewee noting: "I think that the hesitancy to partner with other groups is woven into the culture here." This lack of close relationships with stakeholders beyond the core market library DMU narrowed the cognitive frames of the firm overall (Powell et al., 2005). Without strong external relationships in the core or beyond the core, the firm lacked the innovation networks needed for discontinuous innovation in adjacent or breakthrough environments (Birkinshaw et al., 2007; Dhanarai & Parkhe, 2006; Smart, Bessant, & Gupta, 2007).

Case F had not designed a portfolio organisation, even though the company was aware of the need at executive level to develop opportunities and business beyond the core. The creation of the innovation group was a tangible demonstration of the awareness of the need to develop innovation and NPD capabilities. However the design of a portfolio organisation requires more than the creation of an innovation group. With no portfolio structure in place, the operationalisation of a portfolio organisation had yet to be driven through (Heising, 2012; Klingebiel & Rammer, 2014; Spieth & Lerch, 2014).

5.7.1 What is the influence of context on the operationalisation of search and select?

Innovation portfolio management: The organisation was focused on the core for 85% of revenues, and no structured approach to innovation portfolio management was in place. Case F had recently acquired a company in an adjacent market, and the leadership team were ready to use acquisition as a tool to develop a broader portfolio of products targeting both core and beyond the core markets: “We continue to look for acquisition targets, as a means of innovating and expanding the business.”

Cognition: The organisation was closely connected to the traditional DMU in the core library market: “95% of efforts in the business are tagged and tied into selling, marketing, producing content for, managing the prices and business model of the core.” The strength of the DMU relationships in traditional markets were a core strength, and a core rigidity (Leonard-Barton, 1992). The interviewees found it hard to think beyond the challenges of running the core business, due to the sense that considerable process change was needed to compete effectively in the core, let alone beyond the core.

There was no tradition of working in close partnership with scholarly societies, which reinforced internal, sustaining activities, rather than innovation through collaboration within networks (Birkinshaw et al., 2007). Case F recruited from outside the core industry, broadening cognitive capabilities. However the firm did not use external networks to develop innovation opportunities, and had limited exposure to external networks and ideas that they did not know, which made the development of offerings beyond the core difficult for the firm (Burt, 2004; Parise et al., 2015; Whelan et al., 2011).

Ambidexterity: Competing objectives can be managed in many different ways, and ambidexterity scholars are seeking to understand how firms transit between exploration and exploitation (Swift, 2015), and how they deliver the highest level of achievement in terms of exploitation and exploration simultaneously (Boumgarden, Nickerson, & Zenger, 2012).

The firm managed search and select activities in adjacent markets by giving autonomy to recently acquired companies. However, ambidexterity in the core business was not evident, as the management of search and select activities had not been operationalised in a structured manner alongside other key activities such as keeping up with the technology arms race, and sustaining customer relationships. The capability to manage search and select in the core and beyond the core was not apparent: “Beyond talking to non-librarians in the market about submitting content or managing content, our inquisitiveness has been real but our ability or desire to act on any novel or suggested changes that someone might want hasn’t been delivered.”

Peripheral vision: No respondents felt that the organisation had a systematic way of searching the periphery of the business environment for innovation and NPD opportunities. The weak market research capabilities of the firm did not support vigilance to weak signals, with an informant commenting: “I don’t think we have been traditionally strong at market research.” The weak responses on knowledge management suggested that the firm was weak at sharing the signals that were detected.

Rapid change core: Case F was primarily concerned with developing and applying its operational and dynamic capabilities to keep up with the technological arms race in the core business. Financial and managerial resources were being channelled to the rapid change core, due to the level of change involved in keeping up with the demands of core market stakeholders, and the standards set by industry initiatives and competitors.

5.8 Case G: University Press

Introduction

Case G had a clear focus on its key customers within the core business. The overall search and select capability ratings were 22 out of 30 in core markets, 16 out of 30 in adjacent markets, and 1 out of 33 in breakthrough environments.

As a publisher owned by a university, the acquisition of companies, or investment in other companies, was not possible, reducing the vectors through which opportunities could be developed.

In case analysis

The organisation had decided that there were tangible opportunities beyond the core, edging out to provide solutions to the jobs-to-be-done of previously underserved stakeholders, and to a wider selection of customers globally, rather than just elite institutions. However, this “edge-out” strategy did not include venturing into breakthrough environments.

The organisation had defined the scope of where it was looking to grow, which was “near adjacent”. An interviewee commented: “We’re all doing a pretty good job of forcing ourselves to look out, which is something we haven’t done historically. So that’s been a real conscious effort.” For some years Case G had supported the development and sales of a product outside the core product range, with limited commercial success. The organisation’s long-term view had protected the product from being culled, reflecting the different cognitive frames that can be found in commercial organisations owned by mission-driven institutions.

Case G had used market research extensively to help it make the right choices in the core market, and market research remained heavily skewed towards the core market. While research was taking place into adjacent opportunities, this was a relatively new activity. Case G used its close connections with the academics who provided their content to understand the workflows of educators, evaluating opportunities considering different persona types and choke points. The organisation had MVP processes in place to support product development (Ries, 2011), but mainly in the core.

With disciplined routines in place to evaluate market research, the organisation used multiple techniques to interpret the significance of market derived data. While ownership by a university removed some of the main innovation options such as acquisition (Ahuja & Novelli, 2014), it also brought advantages, such as the

opportunity to work with faculty within their own university to gain insights. An advisory committee, including academics, programme administrators, learning technologists and bloggers supported the organisation's three key activities concerning scoping, scanning and interpreting (Day & Schoemaker, 2006). Case G's extensive networks of education technologists, trainers and educators beyond HE helped it to operate as an outside in organisation (Day & Moorman, 2010).

The interviews revealed that the push into adjacent markets, which required different types of products to match emerging jobs-to-be-done in "new to the organisation markets" was challenging the product development process. Case G had not designed an innovation portfolio structure, and consequently it was not in a position to operationalise a portfolio organisation.

5.8.1 What is the influence of context on the operationalisation of search and select capabilities?

Innovation portfolio management: Case G could see opportunities beyond the core, and the respondents were conscious that different capabilities and processes were necessary to develop a portfolio of products to satisfy the different requirements of core and adjacent markets. Case G had no interest in breakthrough opportunities. However, while an improved product development process was in prospect, there were no plans to develop formal structures to manage NPD across the opportunity portfolio.

Cognition: With a high level of market connectedness, and having received positive results from recent product initiatives, the organisation was ready for change.

However, while the cognitive frames of the organisation were open to new opportunities beyond traditional markets, the rapid change core limited the time and attention given to these opportunities.

While connections with a world leading university were helpful in many ways, the organisation was working through how to work more separately from the university. The expectations and cognitive frames of the university influenced the university press, and the uncertainty as to what level of separation – and freedom of action – might be secured complicated the way that opportunities could be taken forwards.

Ambidexterity: Case G found it difficult to manage the core business, and develop new ways of working, particularly in the areas of technology management and NPD. This limited the conversion of the opportunities that they had validated using MPVs (Morris et al., 2014; Ries, 2011) and market feedback into commercial success.

Peripheral vision: Being vigilant to weak signals: The organisation had no intention of moving into breakthrough environments. Deep connections with HE were underpinned by the organisation's brand, and the readiness of HE stakeholders to provide guidance and insights. The level of connectedness helped the interviewees to be alert to weak signals, and also enabled them to confirm the validity of the weak signals with informed advisors. However knowledge management was weak regarding both the core and beyond the core sectors, limiting the benefits of external vigilance to inform decision making.

Rapid change core: Case G was one of the smaller organisations within the research sample. The operational demands of maintaining and building sales, and developing the product range to meet the needs of disrupting environments, were significant. Many of the operational demands were connected to changing technology, in a business that had been transformed by the wide adoption across HE of tablets (e.g. iPads) to support learning in class. While the organisation had identified and validated opportunities beyond the core, the centrifugal effect of the rapid change core was making it difficult to progress product development and commercialisation in the targeted adjacent markets. Internal constraints, particularly connected with technology management, were limiting capacity to stretch beyond the core.

5.9 Case H: University Press

Introduction

The university press is a part of one of the top ten universities worldwide, with a very strong brand in HE markets.

Case H prided itself on the quality of the content that it publishes. The overall search and select capability ratings were 10 out of 30 in core markets, 4 out of 30 in adjacent markets, and 1 out of 33 in breakthrough environments.

As a publisher owned by a university, the acquisition of companies, or investment in other companies, is not possible, reducing the options through which opportunities could be developed.

At the time of the interviews, the firm was involved in multi-year preparations to migrate its key product platform from one IT system to another.

In case analysis

Case H had not decided to pursue search and select activities beyond the core, as the priority, emphasised in all interviews, was the need to upgrade operational processes to meet the industry standards of performance established by standards organisations (COUNTER, 2015), competitors, and disruptive business models such as OA (Archambault et al., 2013; Lewis, 2012). The focus on operational improvements internally was seen as essential to get the university press ready for greater levels of change internally and externally than it had experienced previously. The organisation was at the extreme “efficiency” end of the exploitation-exploration continuum, resolving technology management issues concerning systems that the university press relied upon to deliver its products to customers.

With the focus on internal change, there were few indications that the university press had scoped where to look for future opportunities beyond the core, and an informant stated: “I would say on balance, more ideas come to us than we generate at the moment. I think we are still more of a recipient of ideas from others.” As a traditional publisher with a powerful editorial function, the search for opportunities remained in the core business, at the subject and content level. The search and selection process for new products did not extend beyond the core business.

While some major market research had been carried out connected to the development of the organisation’s new platform, and some focus group research had also taken place regarding the core market, market research activity had been quite limited. Advisory panels were in place, but all of the connections were with stakeholders within the core business, rather than extending beyond the core.

The analysis of data from the research process appeared to be limited. Industry databases were interrogated to support decision making in the core business. With few opportunities in development beyond securing high quality content at the subject level, there was little “probe and learn” activity evident (Lynn et al., 1996; Phillips et al., 2006).

5.9.1 What is the influence of context on the operationalisation of search and select?

Innovation portfolio management: The university press had not designed a portfolio driven structure, and nor had it operationalised a portfolio driven organisation. Case H had no immediate plans to embrace the portfolio approach, due to the focus on improving internal processes and operational performance in the rapidly evolving HE publishing industry.

Cognition: The university press was: “Very traditional”, and the quality of content, going through to print quality, was highly valued across the organisation. The cognitive frames at both the strategy and operational levels were bounded by the need to achieve operational improvements to lower costs to create the funds to support the development of more proactive, externally orientated projects. The firm

was limited by the lack of scope for acquisitions, which would have the potential to alter mind sets. Close relationships existed with society publishers and senior academics, but these connections were centred on the core business, rather preparing to: “Skate to where the money will be” (Christensen, Raynor, & Verlinden, 2001, p. 73).

The university press remained focused on the traditional B2B DMU in university libraries, rather than moving to a greater emphasis on users. STM researchers and funders have put pressure on publishers to adapt their business models, changing the cognitive frames of STM publishers at the strategic and operational level. The organisation had been cushioned from the need to respond to changing business models such as OA, due to the high proportion of HASS content rather than STM content in their product range.

Ambidexterity: Case H operated as an organisation in exploitation mode, and at the time of the interviews was not engaged in exploratory innovation or significant NPD. With no exploration to be managed, the organisation had not engaged with the choices associated with managerial ambidexterity at the strategic level (Raisch, Birkinshaw, Probst, & Tushman, 2009). However the organisation did face tensions at the operational level concerning how best to increase operational efficiency while seeking to develop strategic capability (Kortmann et al., 2014).

Peripheral vision: Search behaviour requires peripheral vision, to pick up early warnings of emerging trends, behaviours and jobs-to-be-done (Bettencourt & Ulwick, 2008; Schoemaker et al., 2013). With the overwhelming focus on the core business, no respondents felt that Case H had a systematic way of searching the periphery of the firm’s business environment for innovation and NPD opportunities. With limited market research activity, vigilance to weak signals was low.

Rapid change core: The options open to Case H in terms of both exploitation and exploration were identified by the interviewees as being connected to how effectively the organisation was able to manage the rapid change core.

The respondents from Case H identified the need to improve operational effectiveness to enable the development of an innovation portfolio both in the rapid change core, and beyond the core. Due to the disrupting nature of the HE publishing market, dynamic capabilities were required to achieve commercial and operational success in the rapid change core, and in time adjacent and potentially breakthrough environments.

5.10 Case I: Society Publisher

Introduction

While the interviewees stated that they had no mandate to operate beyond core markets, due to the strong mission of the scholarly society that owned the publishing organisation, the researcher found a small but dynamic organisation responding in an agile manner to changes in the wider industry in a decisive and “up with the leaders” manner.

The overall search and select capability ratings were 20 out of 30 in core markets, 17 out of 30 in adjacent markets, and 3 out of 33 in breakthrough environments. As a publisher owned by a scholarly society, the acquisition of companies, or investment in other companies, was not possible, reducing the alternatives through which Case I could grow.

In case analysis

The scholarly society had not made a decision to explore beyond the core to identify emerging opportunities in new markets. This might suggest that the organisation was rooted in its core market, with no impulse to explore new opportunities. As a relatively small organisation, it used good communication, quick decision making, and a determination to keep up with industry leaders as a Fast Second (Markides & Geroski, 2004, 2005) operator.

The scope of the organisation's search and select processes considered not only customer expectations in core markets, but the mission of the wider scholarly society to disseminate research widely. The mission of the society influenced the publishing organisation to embrace OA publishing early, forcing Case I to develop new business models and processes. While many publishers see OA publishing as an adjacent market activity (Laakso et al., 2011; Ware & Mabe, 2015), Case I saw it as one of a range of business models available (Gassmann et al., 2014). Therefore the society saw the scope of the search and select process as being concerned with the dissemination of STM research, alongside commercial issues, freeing up the thinking of the publishing organisation's executive team, and the board of the overall society to adopt OA publishing models relatively early.

Case I watched competitors very closely, and followed them fast when new initiatives were proving successful for them. While lacking the resources of larger publishers, the organisation used its not-for-profit mission as a way of working closely with other societies in non-conflicting subject areas, as well as with funders and government. The society's not-for-profit status enabled it to work closely with the OA movement as new business models and industry standards were developed. A key stakeholder group generating important insights were researchers submitting their work for publication. It was through exposure to the changing requirements of researchers, who can be seen as lead users (von Hippel, 1986), that Case I recognised how important OA was to the researcher and funder community. They were effective at identifying an important job-to-be-done (Christensen et al., 2007; Ulwick, 2002), which in this case was to maximise research dissemination beyond paid access.

STM researchers tend to adopt technology, and new technology enabled routines, ahead of researchers in the HASS subject areas (Rowlands et al., 2011), creating opportunities to deploy the lead user method of innovation search and select.

The interpretation of external market insights was managed through regular meetings of the executive team leading the society's publishing operation. While knowledge management systems were not in place, constant internal communication and a high degree of stakeholder connectedness supports rapid decision making. Market research disciplines were in place, helping to gain feedback on new initiatives

during probe and learn phases (Bessant et al., 2005a; Lynn et al., 1996).

5.10.1 What is the influence of context on the operationalisation of search and select?

Innovation portfolio management: The organisation had not designed or operationalised a portfolio organisation, as the respondents saw the overall society's mission to communicate and disseminate scientific research as limiting them to the core market. Case I had focused on their core HE market to generate revenues and worked closely with leading researchers, but the interviewees did not feel that the mission of the scholarly society permitted them to focus beyond the core. However, Case I's flexible organisational response to the introduction of OA business models targeting dissemination driven researchers and funders had echoes of McGrath's view that competition increasingly takes place in arenas (McGrath, 2013a, p. 9).

Cognition: Due to the importance given to researchers as authors and users - the society was ultimately run for the benefit of researchers - and the high regard attached to what they value, the leadership team of the scholarly publisher had different cognitive frames than commercial publishers at the strategy and operational levels. The closeness to the researcher community, and the need for approval from the researcher community, drove Case I's thinking, helping it to consider different models, and make different decisions based on different criteria when compared to some other publishers.

Ambidexterity: The organisation had demonstrated the capacity to run the core business, keep up with the technology requirements of the rapid change core while using OA models to transform their value proposition and move into adjacent subject areas, with limited resources. Case I demonstrated ambidexterity at both the strategic and operational level, enabled by an outside in approach.

Peripheral vision: Case I did not have ambitions in breakthrough environments. However, the organisation was vigilant to weak signals, demonstrated by their swift identification of OA business models as representing both a threat to securing high quality content, and an opportunity to broaden the product portfolio aggressively.

Rapid change core: Case I was not in the grip of the rapid change core. This had been achieved through strong technology partnering with an outside platform provider, and agile decision making concerning which competitor initiatives to follow. Locating the OA publishing activity in the core, once the process had been established, also appeared to keep core market activities moving fast. The society competed with leading STM publishers, serving innovator and early adopter users (Rogers, 2003), increasing the competitive pressure to keep up with industry developments.

5.11 Case J: Society Publisher

Introduction

Case J had grown revenues strongly in recent years.

The overall search and select capability ratings were 22 out of 30 in core markets, 16 out of 30 in adjacent markets, and 3 out of 33 in breakthrough environments. Case J was owned by a scholarly society, making the acquisition of companies or investment in other organisations complex, reducing the alternatives through which the firm could grow.

In case analysis

The organisation had made the decision to look beyond core markets for growth, and had been rewarded with revenue and reputational growth in adjacent markets in recent years. The move into adjacent markets was tightly scoped, with the focus being on near adjacent markets, partially overlapping with core markets (Day, 2007).

The scholarly society had strong research disciplines in the core and adjacent markets. However, Case J was a content driven publisher, focused on the institutional DMU (Håkansson, 1982; Sheth, 1973).

Alongside disciplined portfolio driven evaluation meetings, the organisation used a peer review inspired assessment approach to evaluate concepts, and the data derived from the market. Agile project management approaches supported probe and learn activities. However the product development process across the portfolio appeared to require some clarification, with a respondent commenting: “We use ‘product development’ in at least three different ways in this organisation.”

While a portfolio management approach had been adopted to managing NPD, Case J used the same individuals and teams to manage both core and adjacent development projects, and had not established a portfolio structure separating out NPD for core and adjacent opportunities, as widely recommended in the literature. With no portfolio structure in place, there was no operationalisation of a portfolio structured organisation.

It appeared that a portfolio structure was not in place partly due to a lack of resources, and partly due to the focus on near-adjacent opportunities that were closely related to the core product range. With significant overlap with the core offering, staff were able to manage both core and near adjacent developments. None of the recent NPD projects ventured far from known products and markets, despite the disruptive internal impact of developing and launching a “new to the organisation” product range.

5.11.1 What is the influence of context on the operationalisation of search and select?

Innovation portfolio management: The society publisher had a strategic framework in place, guiding the development of NPD activities across core and adjacent markets. There was no appetite for activity in breakthrough markets. While the main focus was on the core operation, Case J was an edge-out player. The use of many of the same individuals to manage core and edge-out activities calls into question whether this was a portfolio approach, or was the firm merely looking to develop and market a broader product range in core and near adjacent markets.

Cognition: The organisation looked beyond core markets, and was ready to take on the disruptive internal impact of pursuing opportunities beyond the core. At the strategic level the interviewees were emboldened by the success of a recent near adjacent market development, which had given them confidence. The recent growth of the organisation, allied to a major development programme updating the product platform and other systems had given the interviewees the confidence to try out new processes and pursue opportunities. With an effective OA publishing programme in place, the society had adopted the new business models expected of STM publishers, and developed the associated operational processes. The organisation had become accustomed to change at both the strategic and operational levels.

Ambidexterity: Case J demonstrated that it could explore new opportunities in adjacent markets while simultaneously growing in core markets. At the operational level, the society showed that it could manage core and adjacent opportunities together.

Peripheral vision: Case J had no interest in breakthrough markets, which it saw as outside the mission of the scholarly society overall. However, this was a vigilant organisation, deeply informed about its communities, and the issues affecting them.

Rapid change core: The organisation had invested heavily over the last few years to upgrade the firm's core systems, outsourcing some systems which were formerly developed internally. The benefit of revamping the core systems was that the organisation was competing effectively in the rapid change core market with much larger, sector leading players. Effective technology and product management had enabled Case J to compete beyond the rapid change core.

5.12 Cross Case Discussion

While the strong presence of search and select capabilities in both core and adjacent markets in Cases A, B, D and E does not necessarily indicate that similar internal routines were in place within these firms, an important finding from the research project was that the four companies with the strongest capability ratings in core markets also demonstrated the strongest capability ratings in adjacent markets. None of the ten case company studies were more capable in adjacent markets than in their core markets.

The findings from Case C enriched the research project. The search and select capabilities essential for success in the core market were largely present, and comparable to Cases A, B, D and E. However this large commercial publisher had no structured plans beyond the core, except for the OA division, a publishing activity which is frequently located within the core operation of other publishers, so central is OA publishing capability to competitiveness, particularly in STM subject areas (Björk, 2011; Ware & Mabe, 2015, p. 88-126).

The structure of the 10 case company sample revealed how mission driven, not-for-profit organisations such as university presses and scholarly societies have their innovation capabilities constrained in terms of M&A. There were certain options that these organisations could not plan or action (Chesbrough, 2012; Courtney et al., 1997; McGrath, 2012). However, an organisation's mission can liberate it to adopt new business models, and compete in areas deemed as too uncertain by other players with different missions, as demonstrated by Case I with its proactive actions in the vanguard of the mainstreaming of new OA business models.

5.13 The distribution of search and select capabilities

The distribution of search and select capabilities across the 10 case companies is shown in Figure 5.1 below.

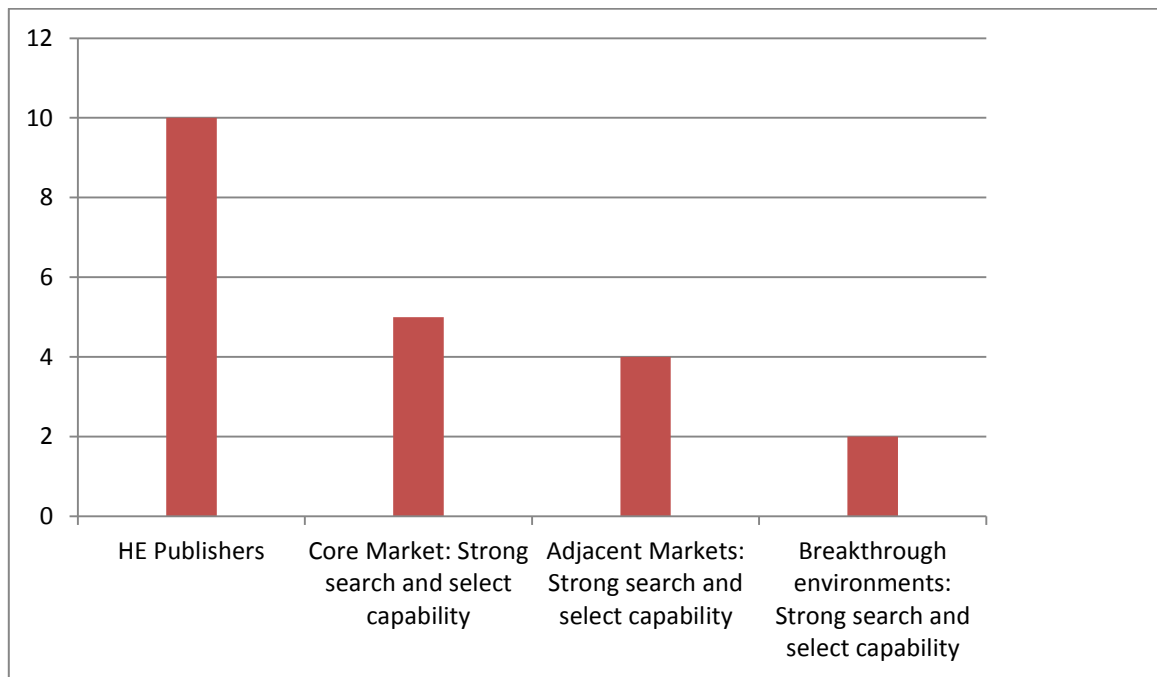


Figure 5.1: The distribution of search and select capabilities across the 10 case companies

Cases A, B, C, D and E all demonstrated search and select capabilities rated at 24 or more out of 30 in core markets. Only four of the ten companies (Cases A, B, D and E) demonstrated search and select capabilities rated at 24 or more out of 30 in adjacent markets. Yet only two of the ten companies (Cases B and D) demonstrated search and select capabilities rated above 10 out of 33 in breakthrough markets.

5.13.1 Why did two publishers demonstrate search and select capabilities in breakthrough environments, and eight did not?

In breakthrough environments, the distribution of search and select capabilities was starkly differentiated. Cases B and D both achieved a capability rating of 33 out of 33, while the third most capable firm, Case A, secured a capability rating of 9 out of 33.

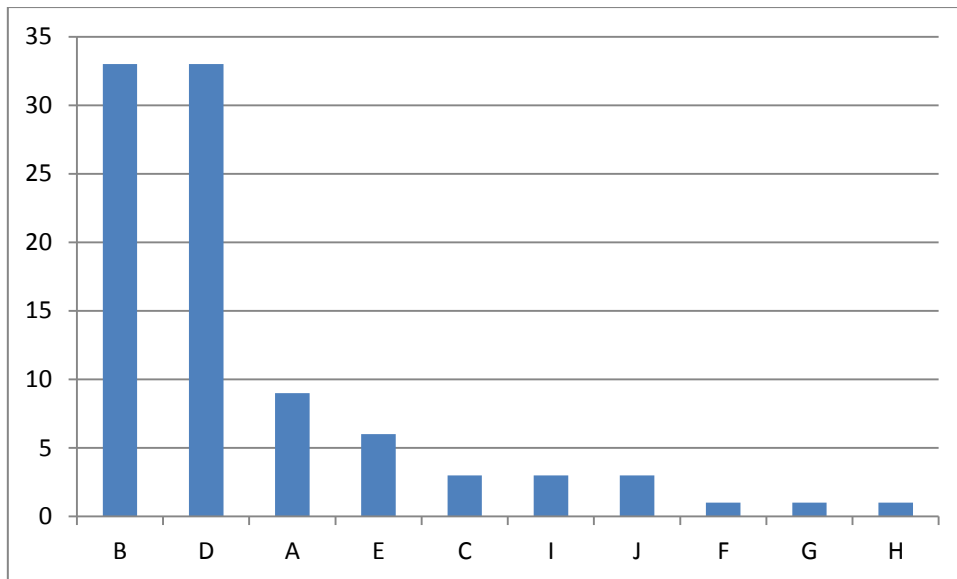


Figure 5.2: Breakthrough environments: Distribution of search and select capabilities ranked by capability rating

Why should there be such a difference between Cases B and D, and the other cases? The more progressive organisations adopted different approaches to developing breakthrough opportunities. Case B used acquisition to secure a workflow orientated organisation targeting lead users, and sought to limit the amount of structure around the newly acquired corporate venture unit (Davis et al., 2009; Hill & Birkinshaw, 2012). Case D had tried both the “internal explorer” and “external explorer” approaches in breakthrough environments, and had discarded the internal explorer model in favour of investment in boundary spanning start-ups and incubation units. Both companies had explicit plans to explore the innovation space in core, adjacent and peripheral environments. What the two firms shared at the strategic level was respect for the practical necessity of not strangling innovative corporate venture units with excessive structure (Davis et al., 2009; Hill & Birkinshaw, 2008, 2012).

In the breakthrough/peripheral space, acquisition activity connects and crosses over with radical innovation. Acquisition brings in new skills, different cultures and complexity. The two large commercial publishers who demonstrated the capacity to operate in peripheral environments with a high level of change, had both acquired or invested in non-content based organisations, and recruited “different thinking” staff to break the mould in terms of business models and approaches to HE markets. None

of the corporate venture units in these two publishers had been in place for more than five years.

5.14 Operationalisation of 11 search and select capabilities across the opportunity portfolio?

The table below has been constructed to inform the discussion regarding the relevance of the capabilities identified through the literature review to operationalising search and select, and links the 11 capabilities to the relevant literature.

In considering the table, it is useful to reflect on a summary by Teece regarding dynamic capabilities in the foreword to “Winning The Long Game” (Krupp & Schoemaker, 2014, p. ix - x): “A firm’s dynamic capabilities rest on two pillars: (1) the vision and leadership skills of managers, and (2) the cohesion and flexibility of the organisation as a whole.” He continues: “One way to think about dynamic capabilities is to divide them into three groups of activities at which successful firms must excel:

- *sensing* needs, threats and opportunities in a timely fashion
- *seizing* attractive possibilities by mobilizing resources, and
- *transforming* the organisation to maintain its effectiveness”

The capabilities identified through the literature review were principally concerned with sensing. However, capability 11 is focused on seizing acquisition and collaboration opportunities. Capabilities one and three are concerned with preparing organisations to develop and pursue a portfolio driven strategic plan, and operationalising search and select across core, adjacent and breakthrough opportunities.

The “research findings” column in Table 5.1 below summarises how the research project confirmed the validity of the 11 search and select capabilities as being key to managing the fuzzy front end across a portfolio of opportunities. The same capabilities, e.g. digital era market research techniques, were required in the core, adjacent and breakthrough environments. However, the capabilities were deployed

in different ways across the portfolio of environments, adapting to a variety of innovation challenges.

Capability required for innovation managed on a Core / Adjacent/ Breakthrough basis	Research findings: Why do organisations need these capabilities?	Key literature influencing inclusion
1) Guided by high level, NPD portfolio driven strategic plan considering core, adjacent and breakthrough opportunities	To avoid getting stuck in the core, firms need a portfolio of options across the core business, and beyond the core business When a portfolio driven strategic plan is in place, it is possible to design the portfolio driven organisation	(Collis & Rukstad, 2008; Cooper et al., 2001; Cooper, 2013; Day, 2007; Klingebiel & Rammer, 2014; McGrath, 2013a; Nagji & Tuff, 2012; Reeves et al., 2015; Urhahn & Spieth, 2014)
2) Search the periphery for innovation & NPD opportunities (breakthrough environments only)	Many organisations lack the capacity to detect and act on weak signals. Vigilance to threats & opportunities in the periphery helps organisations anticipate & respond to signals with the greatest potential impact	(Burt, 2004; Day & Schoemaker, 2004b, 2006, 2008; Fuld, 2003; Prahalad, 2004a; Rossel, 2012; Schoemaker et al., 2013)
3) Operationalise structured search and select processes across core, adjacent and breakthrough opportunities	A portfolio driven strategic plan needs an effective fuzzy front end to identify and select opportunities in the core market, and beyond the core	(Brown & Blackmon, 2005; Day, 2007; Heising, 2012; Helfat & Winter, 2011a; Killen & Hunt, 2013; Kortmann et al., 2014; Sull et al., 2015; Tyagi & Sawhney, 2010)
4) Seek out and share deep contextual domain insights, e.g. macro social, industry and technology trends	Organisations need to scope the uncertainty of the future, to provide structured frameworks to inform the development of a future orientated portfolio of opportunities	(Adner, 2013; Bradfield et al., 2005; De Geus, 1988; Dodgson, Gann, & Salter, 2006b; Ramírez et al., 2013; Schoemaker et al., 2013; Schoemaker, 1995; Wack, 1985)
5) Seek out and share deep domain insights into user workflows	Through understanding digital user workflows, companies can identify and validate relevant user jobs-to-be-done, and the business models to generate value and revenue from them	(Chatterji & Fabrizio, 2012, 2013; Grönroos, 2011; Jamali et al., 2014; Kozinets, 2002; Lilien et al., 2002; Lüthje & Herstatt, 2004; Mahr & Lievens, 2012; von Hippel, 1986; Xie et al., 2008)
6) Deploy digital era market research techniques (e.g. netnography)	Providers of digital solutions benefit from the deployment of a range of market research techniques to understand fast evolving user needs, budgets, DMU structures and priorities	(Cayla et al., 2014; Cooper & Edgett, 2008; Füller et al., 2006; Goffin et al., 2010; Kozinets, 2013, 2015; McAfee & Brynjolfsson, 2012; Radjou & Prabhu, 2015)

7) Identify and validate "big enough" pervasive problems and jobs-to-be-done requiring solutions	In service focused digital markets, organisations benefit from helping customers and users get one or more jobs done. Pervasive problems offer greater opportunities to generate value and revenues than isolated jobs-to-be-done	(Bettencourt & Brown, 2013; Bettencourt, Lusch, & Vargo, 2014; Christensen, Anthony, Berstell, & Nitterhouse, 2007; Christensen, Anthony, & Roth, 2004; Ulwick, 2005)
8) Validate and iterate opportunities through MVP testing and learning	Opportunities require validation, and the early stages of online product development using MVP techniques limit costs, and increase success rates	(Bessant, Lamming, Noke, & Phillips, 2005b; Bettencourt & Ulwick, 2008; Blank, 2013; Lynn et al., 1996; Morris et al., 2014; Reeves, Love, & Mathur, 2012; Ries, 2011; Thomke & von Hippel, 2002)
9) Recruit, connect with and learn from individuals outside the firm's core industry	To be successful, companies need staff and networks with a spectrum of skills and experiences. To be successful beyond core markets, different knowledge sets are needed, coupled with the organisational capability to make sense of the new insights, and exploit them	(Burt, 2000, 2004; Dyer et al., 2011; Eggers & Kaplan, 2013; R. M. Henderson & Clark, 1990; Kaplan, 2011; Parise et al., 2015; Porac et al., 1989; Whelan et al., 2011; Zahra & George, 2002)
10) Identify and validate external acquisition & investment opportunities	The acquisition of companies and development of alliances are part of the innovation toolkit. The identification and validation of high potential opportunities is a key capability	(Ahuja & Novelli, 2014; R. S. Burt, 2000, 2004; Hargadon & Sutton, 2000; Hargadon, 2003; Miller, 2004; Schilling & Steensma, 2002; Villalonga & McGahan, 2005)
11) Act on analysis, investing in, acquiring, and/or collaborating with external organisations	Disciplined follow through is required to acquire firms, and build mutually beneficial collaboration with other organisations. The challenge is whether the organisation has the resources, will and integration skills to acquire companies, and/or collaborate with external organisations?	(Adner, 2013; Ahuja & Novelli, 2014; Birkinshaw et al., 2007; Davis & Eisenhardt, 2011; Desyllas & Hughes, 2010; Dyer et al., 2004; Dyer & Singh, 1998; Powell et al., 2005)

Table 5.1: The 11 innovation search and select capabilities that need to be in place to manage NPD effectively

5.15 The influence of context on the operationalisation of innovation search and select capabilities in disrupting environments

The literature review considered 27 different themes across the innovation canon. In reviewing the findings at the individual case and cross-case levels, and having discussed the findings at the case level, and highlighted the differences in search and select capabilities across the sample above, it is time to consider the five contextual factors that have most influenced the operationalisation of search and select capabilities across the sample.

The most obvious similarities connecting the organisations with the most established search and select capabilities were size, the fact that they were all commercial publishers, and that they were all effective at managing technology. The clear communication of corporate strategy is a key element influencing company performance (Collis & Rukstad, 2008; Kaplan et al., 2005), with visualisation techniques outperforming text in the communication of strategy in terms of attention, agreement and attention (Kernbach et al., 2015). It may appear simplistic, but a key element that separated out the best prepared organisations in terms of managing a portfolio of options was the development and communication of a strategy which clarified that the company's growth plans required the organisation to look for growth across a portfolio of opportunities. Case E demonstrated that the portfolio did not necessarily need to span core, adjacent and breakthrough environments to be successful beyond the core, with Case E having grown beyond the core while limiting itself to opportunities in adjacent markets. However the visible allocation of resources to identify, validate and develop new solutions to pervasive problems beyond core markets was key to success beyond the core.

5.15.1 Innovation portfolio management: Structure across core, adjacent and breakthrough opportunities

Firms that manage a NPD innovation portfolio do so to assess which projects should be supported, to maintain a good balance across a spectrum of potential risk and reward (Cooper, 2011; Tidd & Bessant, 2013). While the importance of innovation portfolio management is rising in the academic literature (Day, 2007; Killen et al., 2007; Killen & Hunt, 2013; Kim & Mauborgne, 2005; McGrath & Macmillan, 2009a), organisations often struggle to manage a portfolio of experiments (Reeves, Haanæs, & Sinha, 2015, p. 72) due to a lack of clarity in their approach, and a lack of structural design to pursue a portfolio of opportunities (de Visser et al., 2010).

The issue of how organisational structure influences performance in dynamic environments is associated with how best to manage an innovation portfolio beyond core markets in disrupting environments (Anderson, 1999; Davis et al., 2009; Hargadon & Sutton, 1997). When organisations choose to manage innovation portfolios, and structure their firms accordingly, inevitably they face the challenges explored in the ambidexterity literature considering how to manage exploit and explore operations simultaneously (Birkinshaw & Gibson, 2004a; Birkinshaw & Gupta, 2013; Davis et al., 2009; Eisenhardt et al., 2010).

Klingebiel & Rammer (2014) revealed that the allocation of resources across a broader range of innovation projects increases new product sales, suggesting that organisations with a portfolio structure are better placed to develop a range of options beyond the core, across adjacent and breakthrough environments.

An ongoing question in the innovation, strategy and organisation literature concerns how the amount of organisational structure influences the performance of a NPD portfolio in dynamic environments (Davis et al., 2009). Reflecting on what contextual factors particularly influenced the presence of search and select capabilities, the importance to the leading case organisations of having a clearly communicated strategy was evident, as well as the need for an appropriate structure to mobilise the strategy. The issue was not “how much structure”, but “what is the appropriate structure?”

Out of the ten case companies, Cases B, D and E had the clearest structures that enabled the operationalisation of their NPD portfolio strategies. However, in the majority of cases, an explicit framework to enable the balanced management of an innovation portfolio was not visible.

Only Cases B and D had pursued options in breakthrough environments. While Case B had adopted an “internal explorer” corporate venture approach, and Case D pursued the “external explorer” route, both had chosen structures that appeared to work for them (Hill & Birkinshaw, 2008).

Case B managed the portfolio through integrating NPD across core and adjacent markets, with development activities bound together through a strong focus on supporting jobs-to-be-done across research workflow. They saw workflows extending from the core into adjacent areas as new, technology enabled jobs-to-be-done emerged. Each new job and extension of the workflow presented opportunities to evaluate. Activities focused on breakthrough/transformational opportunities were managed in a separate division, with a strong presence of staff with experience outside the core business.

Case D had three main divisions, with one focused on the core using an internal explorer approach, a second developing adjacent sectors using an internal explorer approach, and the third using an external explorer approach through investing in boundary spanning start-ups and incubation units. The publisher had a three colour coded portfolio matrix referenced by all the informants from the firm mapping the range of innovation opportunities, inspired by academic and practitioner research (Henderson, 1970; Killen & Hunt, 2013; McGrath & Macmillan, 2009a; Sull, 2009). The portfolio driven strategic imperative, structure and communication confirmed the positive influence of a clearly communicated approach to innovation portfolio management (Collis & Rukstad, 2008; Day, 2007; Kaplan et al., 2005; Nagji & Tuff, 2012; Reeves et al., 2015).

Case E had established a disciplined six-box matrix to manage their innovation portfolio in core and adjacent markets (Day, 2007; Radjou & Prabhu, 2015, p. 33), leaving breakthrough opportunities aside. The structure enabled them to take advantage of proven fast follower routines (Markides & Geroski, 2005). What was telling was that all the Case E interviewees referenced the six-box matrix, and found it useful. Due to the clarity of the strategy, the organisation was very active in adjacent markets. While Case A had set up a division explicitly to explore beyond the core, the organisation lacked the clarity of structure of Cases B, D, and E.

Organisations make acquisitions to bring in additional capabilities and market position in new sectors offering growth potential. Acquisition can be a reliable way to increase revenues, and bring new skills, knowledge and processes into the firm, helping the organisation when it comes to developing a portfolio of innovation options. However research demonstrates a negative relationship between acquisition intensity and internal innovation. Acquisitions take time and attention due to the demanding preparation, negotiations and integration activities involved (Ahuja & Novelli, 2014; Hitt et al., 1991, 1996). Case C's strong financial growth had been built on acquisition, so much so that it was the organisation's dominant logic (Prahalad & Bettis, 1995; Prahalad, 2004a).

All six commercial publishers regularly used acquisition as a tool to expand their portfolio. Five of the six commercial publishers used acquisition to move into adjacent markets, while Case C only used acquisition to bulk up its offering in the core market. Case B used acquisition to move ahead in breakthrough areas. Case F used acquisition to break out of its core into adjacent areas. Acquisition was seen as a key tool in the development of the product portfolio beyond the core by commercial publishers, and they used it in a structured manner. The university presses and scholarly societies were restricted in terms of acquisition, due to their mission, reducing their options to develop the portfolio.

5.15.2 Cognition

Managerial cognition scholars suggest that managerial interpretations of environments influence how organisations respond to them (Eggers & Kaplan, 2013; Ocasio, 1997; Porac et al., 1989; Weick & Daft, 1984). If organisations are going to break out of the rapid change core (and they might choose not to do so), their cognitive frames need to move beyond the core. The cognition literature informs understanding of how leaders (Kahneman & Tversky, 1979; Tversky & Kahneman, 1992) and organisations choose consciously or subconsciously to stay with the core, or to start or deepen their search and select process beyond the core (Eggers & Kaplan, 2009, 2013; Gavetti & Levinthal, 2000; Prahalad & Bettis, 1986; Tripsas & Gavetti, 2000). It is also instructive to consider the contextual influence of cognition on strategy development (Kaplan, 2008b, 2011; Porac et al., 1989) and operations management (Gavetti & Rivkin, 2007; Laamanen & Wallin, 2009).

With the average age of the case companies standing at 178 years, and the informants having spent an average of 17 years in the industry, and 10.3 years with their current firms, there was always the likelihood that some of the cases and individuals were bound by the traditions and cognitive frames of the HE publishing industry, and this was the case. With long service in the core business, the majority of informants faced learning challenges in becoming effective in demanding environments beyond the core, where core capabilities can also be core rigidities (Benner & Tripsas, 2012; Kaplan, 2008b; Leonard-Barton, 1992; Tripsas & Gavetti, 2000).

The technology driven approach opens up opportunities beyond existing areas of knowledge (Dodgson et al., 2006b). The technology intensive cases, with significant numbers of technology staff with experience of other sectors, demonstrated different cognitive frames from the other case organisations. Cases B and D had strong search and select capabilities across the portfolio, and they both recruited staff from beyond the HE publishing industry in technology enabled management positions. Case B's HR probation routines sought to capture relevant ideas and potential solutions from new recruits from beyond the industry, seeking different perspectives demonstrating wider cognitive frames (Benner & Tripsas, 2012; Tripsas & Gavetti,

2000). An informant new to the sector observed: “Technology people build “facts” in different ways”, suggesting that fresh eyes were likely to approach the exploration process differently to industry insiders.

The organisations more exposed to STM stakeholders rather than HASS stakeholders on a regular basis appeared more open to exploring new opportunities. They had more experience of change through their longer exposure to changes in the STM sector, such as new business models inspired by OA publishing and the demands of STM funders for the wider dissemination of publicly funded research, when compared to HASS centred publishers. These findings confirm research suggesting that STM researchers adopt digital tools more rapidly than those in HASS (Rowlands, Nicholas, Russell, et al., 2011; Rowlands, Nicholas, Williams, et al., 2011).

The cognitive frames of the organisations struggling to keep up with the “technology arms race” in the rapid change core were constrained by operational limitations. Comments like: “We’re quite conservative. We like the core business”, and “There are certainly opportunities that come up that are outside the core business, but people get very uncomfortable very quickly” show how cognition can either open up opportunities, as with cases A, B, D, and E, or limit it. The fact that no respondents from five of the case companies felt that the organisation had a systematic process to scan the periphery suggests that the cognitive frames of these organisations were more limited than those firms equipped to scan the periphery.

It was no surprise that the following quote came from one of the cases exploring breakthrough opportunities: “If you are going to be in the information business, and we live in the information age and the information technology driven age, you need to get really good with software and data, which redefines what it means to be a publisher, in terms of information and in terms of information technology.” The findings support the literature on the influence of cognition on managerial activity (Cho & Hambrick, 2006; Eggers & Kaplan, 2013; Kaplan, 2008a).

5.15.3 Ambidexterity

The theory of ambidexterity: “Says that managers are making choices and trade-offs among competing objectives, and when they do their job well they override the organisation’s tendency to go down the path of least resistance” (Birkinshaw & Gupta, 2013, p. 293).

Innovation can be classified along two domains: the proximity to existing market or customer segments, or the proximity to existing products, services and technologies (Abernathy & Clark, 1985; Benner & Tushman, 2003; Danneels, 2002; Jansen et al., 2006). Exploratory innovations are developed to satisfy emerging customers or markets (Danneels, 2002). To create exploratory innovations, new knowledge or a departure from extant knowledge is needed (Benner & Tushman, 2003; Levinthal & March, 1993; McGrath, 2001). In contrast, exploitative innovations are incremental or sustaining in nature, to meet the needs of existing customers or markets (Benner & Tushman, 2003; Christensen & Overdorf, 2000; Danneels, 2002), building on existing knowledge and reinforcing existing structures, processes and skills (Abernathy & Clark, 1985; Benner & Tushman, 2002; Levinthal & March, 1993).

It can be argued that M&A requires ambidexterity to enable the acquisition and integration of other companies in new subject areas, while sustaining commercial momentum in core markets. Just as Reeves et al. (2015) suggest that companies need to select from the strategy “palette” of options, so the requirement for ambidexterity suggests the need for ambidexterity at the strategic and operational level across the innovation portfolio, as highlighted in the literature (Reeves et al., 2015; Tushman & O’Reilly, 2011). Acquisition can be critical in the development of the portfolio in the core, and beyond the core, but the management of M&A requires ambidexterity and the re-allocation of resources to developing opportunities, which many companies find challenging (Sull et al., 2015).

Reeves et al. (2015, p. 175) define ambidexterity as: “The ability to apply multiple approaches to strategy at any given time or successively.” Both Case B and D, through adopting an innovation portfolio approach, had to manage more complex activities than if they had chosen to stay in the core, or had restricted their plans to operate in only core and adjacent markets. These organisations had simplified the ambidexterity challenge through the clear structural separation of responsibilities across the innovation portfolio.

An additional ambidexterity challenge faced by the case companies was the need to manage different exploit and explore innovation activities at different speeds (Brown & Eisenhardt, 1998; Chandrasekaran et al., 2012; Nadkarni & Narayanan, 2007; Turner, Mitchell, & Bettis, 2012). While the core business sometimes required the slowing down of innovation activities, so as not to get ahead of the availability of budgets, as suggested in one interview, rapid development MPV work in breakthrough environments required fast and agile project management to validate opportunities and potential offerings.

For an organisation to be able to operationalise the key innovation search and select capabilities in both core (exploit) and adjacent (explore) markets, they need to be able to run the two processes ambidextrously in different disrupting environments. In reviewing the findings, the significance of a well communicated organisational structure to the cases with the highest rated search and select capability is evident.

15.15.4 Peripheral vision: Being vigilant to weak signals

During the mid-2000s an academic literature grew around the notion of peripheral vision and importance of being vigilant to weak signals (Day & Schoemaker, 2004b, 2005, 2006; Haeckel, 2004), with research regarding these themes continuing in forecasting, scenario planning and the broader field of futures (Tetlock & Gardner, 2015; Cachia, Compañó, & Da Costa, 2007; Ramírez et al., 2013; Schoemaker et al., 2013; Schoemaker & Tetlock, 2012). In disrupting environments, where transient competitive advantage rather than sustainable competitive advantage may be the order of the day (McGrath & Kim, 2014; McGrath, 2013b; Radjou & Prabhu, 2015),

organisations face the challenge of managing threats that can develop, sometimes rapidly, in the periphery of their normal business environments.

Through looking at the edge of traditional markets, companies can find new opportunities, and recognise strategic threats. Major corporations such as Amazon, Apple and FedEx were once upstarts in the periphery, but became incumbents defending their core, and developing a portfolio of opportunities (Foster & Kaplan, 2001; Foster, 2012). Large incumbents now introduce more radical innovations than non-incumbent SMEs (Chandy & Tellis, 2000). However incumbents can be highly vulnerable to competitors and surprises from the new periphery (Bazerman & Watkins, 2008; Christensen, 1997).

Having considered the peripheral vision literature, an important finding was that only two of the organisations (Cases B and D) were operating in the periphery, referred to throughout this thesis as breakthrough environments. The researcher was prompted to collect data about the systematic searching of the periphery by a study which revealed that two-thirds of 140 corporate strategists surveyed admitted that their organisations had been surprised by as many as three high-impact events in the past five years (Fuld, 2003). In addition, 97% of the corporate strategist sample said that their companies had no early warning system in place (Fuld, 2003).

During the interview process 57 managers were asked: "Does the organisation have a systematic way of searching the periphery of your business environment for innovation and NPD opportunities?" Only 11 (19 %) said yes, and 46 said no. In five organisations (half the sample), no respondents replied positively, demonstrating clearly that even during a period where global competition, disruptive business models, social feedback loops, economic uncertainty and technological innovation have combined to make business arenas persistently and radically unpredictable (McGrath, 2013b; Reeves, Love, & Tillmanns, 2012), most managers did not take the periphery seriously when it came to developing options for the future (Day & Schoemaker, 2006; Fuld, 2003; McGrath & MacMillan, 1995b, 2009b).

Only 28% of respondents felt that effective knowledge management or other systems were in place to support innovation and NPD processes in the core business, and this figure was 29% regarding knowledge management beyond the core. The weak knowledge management capability identified in the majority of the case companies undermined the capacity of organisations to interpret the data gathered through the search phase, limiting performance in “Step 4: Interpreting what the data means” in Day and Shoemaker’s (2006) vigilance model.

5.15.5 Rapid change core: Avoiding being pulled back into the core business

The operations literature considering the operationalisation of innovation processes confirms the challenges of cognition and ambidexterity at both the strategic and operational levels, particularly when considering the tensions between managing the rapid change core and adjacent markets (Goodale, Kuratko, Hornsby, & Covin, 2011; Helfat & Winter, 2011b; Kortmann et al., 2014; Salerno et al., 2015).

During the interviews, discussion about innovation beyond the core repeatedly turned to the constraints limiting innovation in adjacent or breakthrough environments. Case H, a university press, found it hard to look beyond the core business, due to the operational need to keep up with the ongoing “technology arms race” within the core market. A respondent from Case F (medium sized commercial publisher) explained: “95% of efforts in the business are tagged and tied into selling, marketing, producing content for, managing the prices and business model of the core.” Comments such as these sparked the notion of the “rapid change core”, where leaders and operational managers are challenged to manage the core operation in high velocity core markets (Christensen, 1997; D’Aveni & Gunther, 1994; McGrath, 2013b).

The core business was found to be demanding, particularly in terms of the organisation’s technology capability, as competition to increase the visibility of online content had become intense. In technology centric organisations like publishers, the notion of “core” can be dangerous, as it can suggest that there is limited change in core markets. This is not the case in HE publishing. The phrase “rapid change core” acknowledges that digitally focused organisations can be stretched in their core

business. When organisations struggle to keep up in the rapid change core, they also find it difficult to develop and operationalise a balanced innovation portfolio.

Only two out of the ten cases were catching up with technology demands in the core business (Cases F and H), while the other eight cases were competitive in the technology “arms race” in core markets. However the demands of the rapid change core were limiting activities in adjacent environments at eight out of ten of the cases. Only Cases B and D, who were the only firms active in breakthrough environments, were not constrained by the rapid change core in exploring adjacent or breakthrough environments.

5.16 Modified version of Day and Schoemaker’s “Seven steps to bridge the vigilance gap” process

Day and Schoemaker (2006, p.3) set out to establish: “How can managers and their organisations build a superior capacity to recognise and act on weak signals from the periphery before it is too late?” To help improve peripheral vision, they explored underlying organisational processes and capabilities, and developed a seven-step process (Day & Schoemaker, 2006, p.5) for understanding and enhancing peripheral vision:

- Step 1: Scoping: where to look
- Step 2: Scanning: how to look
- Step 3: Interpreting: what the data means
- Step 4: Probing: what to explore more closely
- Step 5: Acting: what to do with these insights
- Step 6: Organizing: how to develop vigilance
- Step 7: Leading: an agenda for action

Their first five steps focused on improving the process of receiving, interpreting and acting on weak signals from the periphery. The last two steps were concerned with building the broader organisational capabilities and leadership to support organisations in the deployment of peripheral vision routines to improve decision making. Their aim was to make peripheral vision an integral part of the organisation’s

processes, leadership priorities and culture (Day & Schoemaker, 2006 p. 4-6), connecting the management of the seven steps to bridge the vigilance gap to the management of the wider organisation.

The study reported here considers a broader research question: “How do organisations manage innovation search and select in disrupting environments?” In contrast to Day and Schoemaker’s book, the research project focused on the wider search and select process, including peripheral vision, across core, adjacent, and breakthrough environments. The study took place in a specific industry (HE publishing), in a sector disrupting at the time of the research interviews.

Leaders and managers require a process to organize their search and select activities covering core markets (essential), adjacent markets (recommended) and breakthrough environments (for the far sighted and operationally excellent). Building on Day and Schoemaker’s seven-step process, a nine step operational process to enable the effective management of the search and select processes in turbulent digital environments is proposed below.

5.16.1 Proposed version of Day and Schoemaker’s “Seven steps to bridge the vigilance gap” process

The proposed model adds two steps, and recommends extensions to four of the seven steps contained in the original model.

While Day and Schoemaker’s 2006 model recommended that organisations take the decision to look for risks and opportunities, the findings from the study and the literature indicate that organisations only establish NPD portfolio driven strategic plans considering core, adjacent and breakthrough opportunities once they have decided to look beyond the core. The proposed model therefore adds a “Deciding to look beyond the core” step at the start of the process. The need for this step is also confirmed by the literature on strategic renewal and organisational inertia (Binns, Harreld, O’Reilly, & Tushman, 2014; Tellis, 2013; Tripsas & Gavetti, 2000).

The extension to Day and Schoemaker’s 2006 model also recommends an

additional step four: “What to look for.” Identifying the opportunities with the greatest potential for “offering providers” (companies) focused on customers and users (not always the same as customers) is increasingly important, and complex, particularly when it comes to digital products. However, each market, or arena (McGrath, 2013b) requires offering providers to identify specific and relevant user and customer jobs-to-be-done and measures of value (Bettencourt et al., 2013; Bettencourt & Ulwick, 2008; Ulwick, 2002) in the “What to look for step”, which is explained more fully in section 5.18.

Extensions are recommended to four of the original steps, described in Table 5.3 below:

- Step 2. Scoping: Where to look
- Step 6. Probing: What to explore more closely
- Step 8. Designing The Portfolio Organisation
- Step 9. Operationalising The Portfolio Organisation

The nine step process	Key features, extending Day and Schoemaker's seven-step process
1. Deciding to look beyond the core	Organisations need to decide to look beyond the core to develop opportunities for the future, before they can mobilise search and select BTC. This is an addition to Day and Schoemaker's seven-step process
2. Scoping: Where to look	The need to scope "where to look" is fundamentally the same as the original process. However, to scope core, adjacent and breakthrough environments for opportunities to develop new offerings, HE publishers need to scope their search and select activities considering issues such as user workflows and DMU maturity. The author proposes a scoping framework guiding where to look for NPD opportunities in section 5.17
3. Scanning: How to look	The essence of this step is the same. What has changed is the range of digital era market research techniques now available
4. What to look for	This step is new. Identifying the opportunities with the greatest potential for customers, users (not always the same as customers) and "offering providers" (companies) is increasingly important, and complex, particularly when it comes to digital products
5. Interpreting: What the data means	This step remains the same. However, in the digital, big data era, there is more information to make sense of, and firms and business ecosystems are juggling deadlines and priorities
6. Probing: What to explore more closely	The need to decide what to probe further stays the same. The development of agile development techniques and MVP processes supports the probe and learn step
7. Acting: What to do with these insights	This step remains very much the same. Cognition influences how organisations act and respond to opportunities, as do the organisation's knowledge management and learning processes
8. Designing The Portfolio Organisation	This builds on the "organizing" and "leading" steps, encouraging firms to design portfolio organisations to develop a range of options for the future across at least core and adjacent markets, and possibly breakthrough environments as well
9. Operationalising The Portfolio Organisation	Building on the "organizing" and "leading" steps, and benefitting from research into the governance and operations aspects of innovation, this step focuses on operationalising the portfolio driven organisation

Table 5.2: Modified version of Day and Schoemaker's "Seven steps to bridge the vigilance gap" process

5.17 Scoping framework guiding where to look for NPD opportunities

A wide range of tools have been developed over many years to map innovation options, helping firms to make important decisions considering a range of opportunities (Ansoff, 1957; Cooper, 2011; Day, 2007; Henderson, 1970; Kim & Mauborgne, 2005; McGrath & MacMillan, 2009b). Effective NPD portfolio management aims to achieve a balance between high-risk/high-reward projects, and more limited sustaining innovation projects focused on exploitation markets (Cooper, 2011; Day, 2007; Nagji & Tuff, 2012; Zedtwitz et al., 2014).

The study has highlighted the attention given by HE publishers to understanding the workflow of key stakeholders, particularly the case companies with the highest presence of search and select capabilities. While the importance of workflow is well established in the BPM literature (Aalst et al., 2003), innovation researchers have not yet focused extensively on how the understanding of lead user workflows may offer valuable insights into the hidden needs (Goffin et al., 2010; Yip, Phaal, & Probert, 2014), and the outcomes sought by customers and users (Bettencourt et al., 2014; Osterwalder et al., 2014; Ulwick, 2002).

Influenced by Utterback and Abernathy's innovation life cycle (1975), and their three stages of fluid, transitional and specific (standardised) product and process design, the researcher has developed a scoping framework, shown in Figure 3, that guides companies to map their search and select routines considering, on the vertical axis:

- Standardised workflow, where keeping up with industry technology and business models is what is required
- Transitional workflows, where there is inconsistent knowledge. Transitional workflows can include the phases where processes are consolidating, where the workflow is evolving from being fluid in breakthrough markets, to a state where a set of emergent workflows is starting to form. These workflows are regularly targeted by consolidating, fast second organisations (Markides & Geroski, 2004, 2005). Due to the lack of clarity of transitional workflows, this activity is resource demanding

- Fluid or “rapid change” workflows which are “hard to pin down”, where the requirement is for new knowledge in uncertain environments. This activity is time and resource demanding

The horizontal axis uses a typical core-adjacent-breakthrough approach to indicate how organisations face the challenge of managing the search and select process across a spectrum of environments, from core markets where knowledge is high and relatively easy to access and prioritise, to breakthrough areas with few reference points and significant uncertainty. The research project has been conducted in a B2B context, and so the horizontal axis emphasises the level of stability and clarity of understanding regarding the budgets and related DMUs targeted through NPD activities.

While the probability of failure increases the further that projects are from the core business, or from standardised workflows (Ansoff, 1980; Day, 2007), the cumulative return on innovation investments allocated in adjacent and/or breakthrough environments also increases the further that activities are located from the core (Kim & Mauborgne, 2005; Nagji & Tuff, 2012).

Outcome driven innovation (Bettencourt & Ulwick, 2008; Christensen et al., 2007; Ulwick, 2005) focuses on the jobs-to-be-done in the user and customer’s workflow. The emphasis in the framework is on identifying jobs-to-be-done, and the wider workflow processes that these jobs are connected to, and expands the NPD focus beyond existing physical products, existing services and service capabilities to address the central needs of their customers, supporting the jobs and outcomes their users and customers seek to achieve (Bettencourt et al., 2013; Christensen et al., 2005; Day, 2006; Osterwalder et al., 2014). The framework supports “new offering development” rather than more limited NPD.

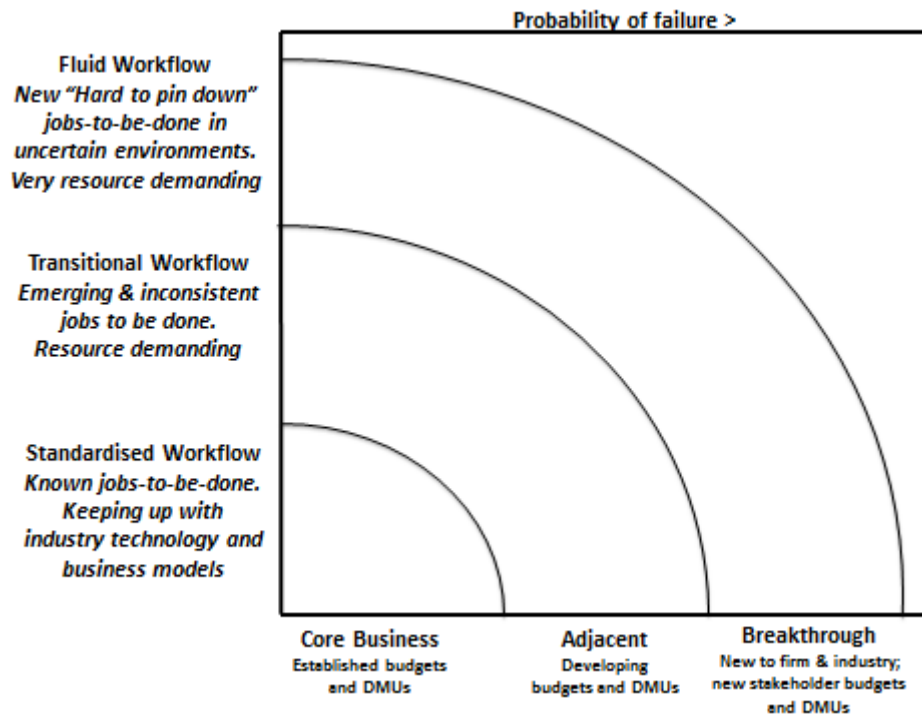


Figure 5.3: Scoping where to look for NPD opportunities across the innovation portfolio considering workflow and jobs-to-be-done

The framework is developed further through using different sizes of dot proportional to a project's estimated revenue, or profitability, building on previous research into options (McGrath & Nerkar, 2004; McGrath, 1997) and portfolio risk management (Day, 2007; McGrath & MacMillan, 2009b). Through using appropriate financial measures, the framework can be used to map individual projects within a wider NPD portfolio, integrating a range of opportunities such as internally developed projects, collaborative initiatives across a network or organisations, and M&A activity.

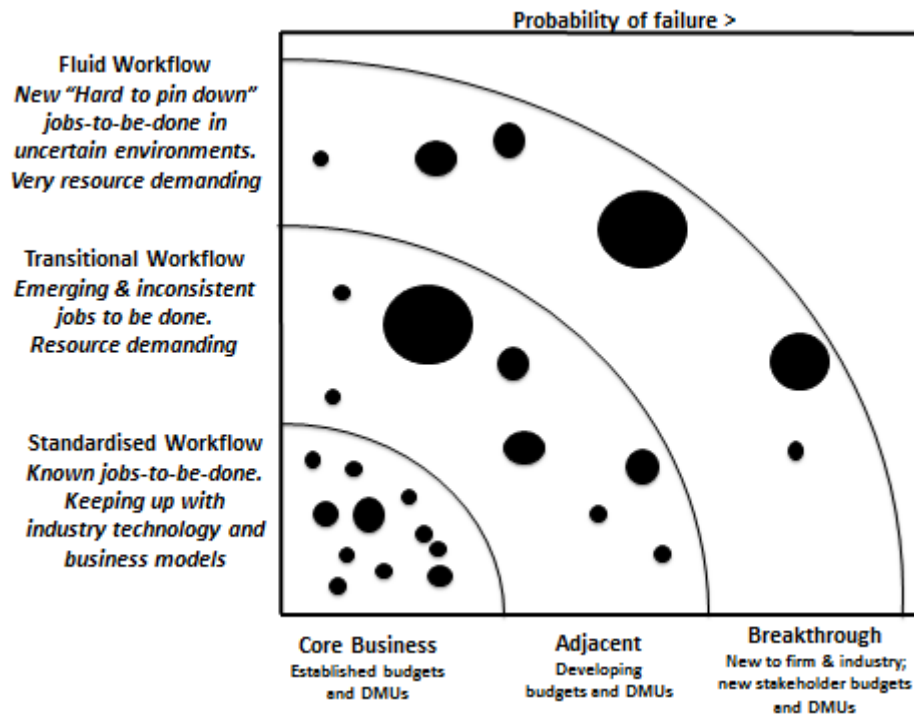


Figure 5.4: Scoping where to look for NPD opportunities across the innovation portfolio considering workflow, jobs-to-be-done and project potential

5.18 What to look for: Identifying ten key market insights that inform NPD in a HE publishing sector demanding integrated content and service offerings

Levitt (1972, p 50) proposed the concept of a company's product as: "A tool to solve their (customers') problems", and the notion of problem solving as the focus for search and select activities outside the firm has been established (Nickerson & Zenger, 2004), with different types of problem solving requiring different forms of governance (Felin & Zenger, 2014). Through adopting the "jobs-to-be-done" approach to problem solving (Bettencourt et al., 2014; Christensen et al., 2007; Johnson, 2010; Ulwick & Bettencourt, 2008; Ulwick, 2002, 2005), value propositions become more focused on integrated product and service solutions (Yip et al., 2014) that deliver value-in-use (Grönroos, 2008; Macdonald, Wilson, Martinez, & Toossi, 2011).

Four of the cases (A, B, D and E) were found to conduct research into the jobs-to-be-done by users and work groups, and the measures used by customers to assess if the jobs have been completed successfully. The further that the product

development process was from the core market of Cases B and D, the more that the value proposition development process (Anderson et al., 2006; Payne & Frow, 2013, 2014) moved on from goods dominant logic (GDL) to service dominant logic (SDL) (Vargo & Lusch, 2004, 2010). Products targeting adjacent markets see service as an integral part of what is sold (Levitt, 1980), and researchers exploring product-service systems (PSS) define them as consisting of a collection of products and/or services that fulfil a customer's needs (Yip et al., 2014). When considering product-service systems, stakeholder engagement is the key process for securing information from individuals and organisations who may use the PSS, or may be impacted by it (Freeman, 1984; Kohli & Jaworski, 1990; Yip et al., 2014).

The interviews revealed that the development of stakeholder targeted solutions in breakthrough HE environments to support research community workflow processes sees the development of user orientated, technology intensive products, in contrast to the content focused products in the core. The development of products in adjacent markets benefited from a mix of integrated content and user jobs-to-be-done inspired NPD (Bettencourt et al., 2013, 2014; Christensen et al., 2007; Ulwick, 2002, 2005). Workflow centred solutions were designed to align with both user and sectoral workflows, recognising that in HE environments users, departments and even whole universities are part of the wider HE ecosystem, requiring Adner's "Wide Lens" to inform how a company's offering needed to integrate with a range of partners (Adner, 2013). While in some product arenas firms like Google, Facebook, Apple and Amazon strive to enable, and benefit from, a major part of a workflow, an important finding in HE publishing was that only the very largest companies can attempt to offer an integrated solution to a workflow challenge. However, Cases A, E, and G found that by understanding the workflow processes of teachers, products could be developed to play their part within a larger, more complex workflow process.

The focus given by the case companies to understanding the workflow of authors and users was one of the strongest themes identified through the data collection process. All of the cases were well informed about author workflows affecting core markets, but only six of the cases had well established capabilities in place to understand core market user workflows. However, the further that NPD activities

moved beyond the core, the lower the level of user understanding. Five of the cases did not have the capability to understand user workflows in adjacent markets, and this dropped to two out of ten regarding breakthrough/transformational environments (see Figure 5.2). The feedback from the interviews was that the informants found it important to focus on workflow centred solutions, but firms did not need to deliver the wider software system through which the overall workflow is managed, which was beyond the capacity of any one provider.

All of the cases, apart from F & H, had well established activities to evaluate the ecosystem affecting their core and adjacent markets, and six of the cases (A,B,D, E, I and J) were well informed about the ecosystem affecting both core and adjacent markets. Only cases B and D had the stated ambition to explore transformational (breakthrough) environments, and only these two firms had the capability in place to assess effectively influences on the ecosystem in transformational environments. An enabling factor influencing the capability of an organisation to make sense of peripheral environments appeared to be having advanced technological understanding beyond the core industry.

The fuzzy front end (Khurana & Rosenthal, 1997; Koen et al., 2001; Reid & de Brentani, 2004) is the process through which companies identify and select the product designs that they need both to sustain performance, and to develop the “next” offering required to create a broad portfolio of revenue earning options for the future (McGrath & MacMillan, 2000; Prahalad, 2010). With at least 70% of a product’s total development costs influenced by R&D design decisions (Radjou & Prabhu, 2015, p. 36), it is imperative for organisations to identify and solve key problems for stakeholders without over-solving their problems and incurring unnecessary cost (Christensen & Raynor, 2003), while generating returns aligned with the velocity and trajectory of markets in an era of transient competitive advantage (Kim & Mauborgne, 2005; McGrath, 2013b). A firm that does not know what to look for, and which does not have the capabilities to operationalise the search and select process across the innovation portfolio, will limit the NPD process in disrupting environments, however familiar they might seem.

Particular insights were gained through interviews with Cases A, B and D: these brought to light the importance of identifying and validating pervasive problems big enough to target, with attractive budgets to pay for new solutions, and with sufficient project development time to develop a solution. All of the cases, apart from F and H, had well established capabilities in identifying and validating pervasive problems in core markets. Four cases had well established capabilities in identifying and validating pervasive problems in adjacent markets. Only cases B and D had proven capabilities in the identification and validation of pervasive problems in breakthrough environments.

As might be expected in a sample of companies with an average age of 178 years, all the cases had well established capabilities in the identification of budgets in core markets. All the cases apart from H had identified budgets to target in adjacent markets. Four of the cases (A, B, D, and E) had identified multiple budgets to target in adjacent markets, while cases B and D had identified multiple budgets to target in breakthrough markets.

The identification of the metrics, or the market facts as some interviewees preferred to call them, that helped to identify that there was a job-to-be-done, or that demonstrated that a problem had been solved through value being delivered, had a major influence on mobilising NPD projects. This confirmed the importance of the “measures of value” (Ulwick, 2005, p.26) that assess the user and customer’s desired outcomes (Ulwick, 2002).

The interview process generated repeated references to the importance of developing appropriate business models, as NPD initiatives targeted workflows that were transitional, i.e. the firms were developing and getting market feedback about a variety of value propositions and business models regarding opportunities where there was no dominant design (Utterback & Abernathy, 1975). The challenges were even greater when NPD efforts were targeting new, digitally enabled jobs-to-be-done in transformative environments, when many users assumed that services should be available at no cost (Archambault et al., 2013; Hertel et al., 2003). The lack of definition and a common vocabulary makes it difficult to be clear what practitioners or academics mean when they refer to business models, as noted by Zott, Amit, and

Massa (2011, p. 1020): “It appears that researchers (and practitioners) have yet to develop a common and widely accepted language that would allow researchers who examine the business model construct through different lenses to draw effectively on the work of others.” However, the interviews surfaced the challenge of how organisations capture value and can justify an invoice, even for a micro-payment, when new products are being developed to deliver value to solve emerging jobs-to-be-done in transformative environments.

The research was conducted in the HE publishing sector, where publishers typically used B2B marketing techniques to target B2B decision making units. While products were used by individuals, commercial transactions were conducted business-to-business. The cases were all well informed about DMU structures and influences in core markets. All the cases apart from Case H were well informed regarding some DMU structures and influences in adjacent markets – particularly Cases A, B, D and E. On occasion, e.g. Case F, this knowledge had been acquired through a company acquisition. Only cases B & D had detailed understanding of emerging DMUs in transformative environments.

Following the literature review, interactive research process, findings analysis and discussion, the author proposes a conceptual model identifying ten key market insights that firms in the HE publishing sector need to establish through the “What to look for” (stage 4) in the proposed modified version of Day and Schoemaker’s “Seven steps to bridge the vigilance gap” process. In developing the conceptual model, the author contributes to theory through bringing together and clarifying activities in the “What to look for” step integrating a number of key elements.

The model was triggered following a re-reading of Prahalad and Ramaswamy’s (2003) reflections on experience innovation, the advantages of portfolio driven innovation (Day, 2007; Nagji & Tuff, 2012; Radjou & Prabhu, 2015), the innovation life cycle (McGrath & MacMillan, 2009b; McGrath, 2013a; Utterback & Abernathy, 1975), the move in many B2B markets from DMU focused solutions to user driven outcomes (Baldwin & von Hippel, 2011; Chatterji & Fabrizio, 2013; Grönroos, 2011), targeting jobs-to-be-done (Bettencourt et al., 2014; Christensen et al., 2007), and value metrics as raised in the interviews with Cases A, B and D in particular and the

relevant literature (Bettencourt et al., 2013; Bettencourt & Ulwick, 2008; Ries, 2011; Ulwick, 2002, 2005). The model was also influenced by the changing budgets and value proposition requirements within B2B customers discussed with cases A,B,D, E, G, and I in particular and supported by the relevant literature (Anderson et al., 2006; Deeken & Yoon, 2013), as well as reflections on how new products solve new problems, and require new methods for customer value assessment, as raised by Cases B and D especially and supported by the relevant literature (Lindgreen et al., 2012; Payne, Storbacka, & Frow, 2008).

The issue of developing new business models (Zott et al., 2011) to capture value from solving new jobs-to-be-done (Christensen et al., 2007; Ulwick, 2002), in complex business ecosystems (Adner, 2013) in digital environments (Fitzgerald, Kruschwitz, Bonnet, & Welch, 2013; Westerman et al., 2014) is challenging, and requires key insights from stakeholders. The “What to look for” step is proposed as a model to clarify how organisations operating in digital environments can identify the key market information and value metrics needed to inform “new offering development”, and the development of appropriate value capture models across a portfolio of opportunities.

Table 5.4 brings together the findings from the field work, and the academic literature that supports the identification of ten market insights key to NPD success in HE environments.

What to look for: 10 key market insights	Evidence from the cases: <i>Italics have been used to identify where findings particularly emerged through the interview process, rather than being prompted by the literature review</i>	Academic literature
1) Ecosystem influences	Cases A,B,D, E, I and J were all particularly well informed about the ecosystem affecting their core and adjacent markets. Only cases B and D had the capability in place to assess effectively the influences on the ecosystem in breakthrough environments.	(Adner, 2006, 2013; Bradfield et al., 2005; Day & Schoemaker, 2004b; De Geus, 1996; Håkansson, 1982; Krupp & Schoemaker, 2014; Radjou & Prabhu, 2015; Rohrbeck & Gemünden, 2011; Schoemaker et al., 2013; Wack, 1985; Winter, 2004; Wright, Cairns, & Bradfield, 2013)
2) Standardised workflow	<i>The significance of understanding the workflow of authors and users was one of the strongest themes identified through the data collection process, as this had not been identified through the literature review.</i> All of the cases were well informed about author workflows affecting core markets. Cases A, B, D, E, I and J (6 in all) had well established capabilities to understand user workflows in standardised workflow environments	(Aalst, Hofstede, & Weske, 2003; Georgakopoulos, Hornick, & Sheth, 1995; Ko, Lee, & Lee, 2009; Rowlands, Nicholas, Russell, Canty, & Watkinson, 2011; Womack, Jones, & Roos, 1990)
3) Transitional workflow	<i>The 5 cases identified below all demonstrated through their comments that the understanding of workflows was a key part of their NPD activities in adjacent markets.</i> Cases A,B,D,E and I (5 in all) had well established capabilities to understand user workflows in transitional workflow environments.	(Aalst, Hofstede, & Weske, 2003; Georgakopoulos, Hornick, & Sheth, 1995; Ko, Lee, & Lee, 2009; Rowlands, Nicholas, Russell, Canty, & Watkinson, 2011)
4) Fluid workflow	<i>Cases B and D, the cases with the strongest capabilities across the portfolio, revealed that understanding the main workflows evident across the portfolio was a key part of their search and select process. Strong technology capabilities within these two cases appeared to support their adoption of workflow driven search and select routines.</i> Cases A, B, and D had capabilities in place to understand the fluid workflows affecting core markets. Only cases B and D had well established capabilities to understand fluid user workflows in adjacent and breakthrough environments.	(Aalst, Hofstede, & Weske, 2003; Georgakopoulos, Hornick, & Sheth, 1995; Ko, Lee, & Lee, 2009; Radjou & Prabhu, 2015)
5) Jobs-to-be-done	<i>The significance of jobs-to-be-done emerged through the interview process, particularly through the comments of interviewees from Cases A,B, D and E.</i> <i>The evidence below has been compiled through assessing the interview transcripts.</i> Cases A,B, D, and E conduct research into the jobs-to-be-done by users and work groups, and the measures used by customers to assess if the jobs have been completed successfully. Only Cases B and D, the two companies with the clearest strategy, and strongest search and select capabilities, sought to identify jobs-to-be-done across the portfolio. Cases B and D were also the most advanced companies in terms of technology, and recognised that HE job-to-be-done include capturing, analysing and making sense of data.	(Bettencourt, Blocker, Houston, & Flint, 2015; Bettencourt et al., 2013, 2014; Bettencourt & Ulwick, 2008; Christensen et al., 2007, 2005; Christensen & Raynor, 2003; Johnson, 2010; McGrath, 2013a; Osterwalder et al., 2014; Ulwick & Bettencourt, 2008; Ulwick, 2002, 2005)

6) Pervasive problems	<p><i>Cases A, B and D particularly emphasised the importance of identifying and validating pervasive problems that were big enough to target within a realistic timescale.</i></p> <p>All of the cases apart from F & H had well established capabilities in identifying and validating pervasive problems in core markets.</p> <p>Cases A,B,D,and E (4 in all) had well established capabilities in identifying & validating pervasive problems in adjacent markets.</p> <p>Only cases B and D had proven capabilities in the identification & validation of pervasive problems in transformative environments.</p>	(Christensen et al., 2004; McGrath, 2013a; Radjou & Prabhu, 2015; Shane & Venkataram, 2000; Williams & Wood, 2015; Wood & McKelvie, 2015)
7) Budgets to target	<p><i>All the cases have identified key budgets to target in core markets.</i></p> <p>All the cases apart from H had identified budgets to target in adjacent markets.</p> <p>Cases A,B,D, & E had identified multiple budgets to target in adjacent markets.</p> <p>Cases B & D had identified multiple budgets to target in breakthrough markets.</p>	(Brennan et al., 2014; Ellis, 2011; Osterwalder et al., 2014; Sheth, 1973)
8) DMU structure, and the influences on the buying decision	<p><i>All the cases were well informed about DMU structures and influences in core markets.</i></p> <p>All the cases apart from H were well informed regarding DMU structures and influences in adjacent markets – particularly cases A, B, D and E.</p> <p>Only cases B & D have advanced understanding of emerging DMUs in transformative environments.</p>	(Anderson et al., 2006; Brennan et al., 2014; Deeken & Yoon, 2013; Ellis, 2011; Ho, Xu, & Dey, 2010; Sheth, 1973)
9) Value metrics (facts)	<p><i>The significance of identifying the metrics, or facts as some interviewees preferred to call them, that helped to identify that there was a job-to-be-done, or that demonstrated that a problem had been solved through value being delivered, was an important finding</i></p>	(Anderson et al., 2006; Bettencourt & Ulwick, 2008; Grönroos, 2011; Lindgreen et al., 2012; Payne & Frow, 2013, 2014; Ulwick, 2005)
10) Value capture	<p><i>While there was a lot of reference to business models, a real challenge for NPD efforts targeting adjacent and particularly transformative environments was value capture in digital markets, when many users assumed that services should be available to access at no cost.</i></p>	(Gassmann et al., 2014; James, Leiblein, & Lu, 2013; Johnson, Christensen, & Kagermann, 2008; Osterwalder & Pigneur, 2010; Zott et al., 2011)

Table 5.3: What to look for: Ten key market insights

5.19 Discussion Summary: How do organisations manage search and select in disrupting environments?

In the rapid change core, the pressure to keep up with technology development in known markets with established (but often static or shrinking) budgets to target, can increase. When it comes to managing search and select in adjacent markets, the environment is less certain. With less tacit knowledge of jobs-to-be-done, budgets, competitors and contextual factors, the requirement to understand the unfamiliar and make decisions is challenging. While the headings of key market information might stay the same, exploring adjacent markets may require different roles and people, possibly with different cognitive frames, skills and experience, to operationalise search and select successfully beyond the core. An organisation structured and resourced with an appropriate portfolio of corporate venture units (Hill & Birkinshaw, 2008, 2012) applying simple rules (Davis, Eisenhardt, & Bingham, 2009; Sull & Eisenhardt, 2012) linking organisational design, strategy, dynamic capabilities and operational excellence (Eisenhardt et al., 2010; Helfat & Winter, 2011c; Kortmann et al., 2014; Teece et al., 1997) is well positioned to develop a portfolio of NPD options (Cooper, 2013; Eggers, 2012).

The level of complexity progressively increases when organisations decide to develop a portfolio of options including breakthrough environments (Rivkin & Siggelkow, 2005; Sargut & McGrath, 2011; Bessant et al., 2005b; Bessant, Von Stamm, Moeslein, & Neyer, 2010). Not only do organisations need to choose which strategies to use across the portfolio, they also need to adopt appropriate operational approaches across the corporate venture units attempting to manage and provide governance across rapid change core, adjacent and breakthrough environments (Reeves et al., 2015; Sull et al., 2015; Urhahn & Spieth, 2014).

The case companies were all seeking at least some of the key market insights shown detailed in Table 5.9, which displays evidence from the interview process alongside the literature supporting the identification of the ten key market insights that inform NPD in HE publishing.

A recommendation is that firms develop and operationalise portfolio driven structures and processes to identify and evaluate the jobs-to-be-done that they aim to solve for unfamiliar users, targeting a variety of emerging budgets in adjacent and breakthrough environments.

5.19.1 Contribution 1: The 11 innovation search and select capabilities that need to be in place to manage NPD effectively

The literature review identified 11 capabilities that organisations need to have in place to manage the fuzzy front end of the innovation process effectively (Khurana & Rosenthal, 1997), particularly considering the opportunity identification and selection tasks identified by Koen et al (2001). The presence of the capabilities in the case companies was assessed in the findings chapter. The discussion validates the significance of the 11 capabilities to the management of NPD focused search and select processes across the NPD portfolio in HE disrupting environments.

5.19.2 Contribution 2: The influence of context on the operationalisation of search and select capabilities in disrupting environments

Research Objective 7 challenged the researcher to answer the question: “What is the influence of context on the operationalisation of innovation search and select capabilities in disrupting environments?” The research process generated data concerning how organisations manage innovation search and select in the HE publishing industry, and identified five contextual variables that influence how search and select is operationalised in disrupting environments:

1. Innovation portfolio management: Structure across core, adjacent and breakthrough opportunities
2. Cognition
3. Ambidexterity
4. Peripheral vision: Being vigilant to weak signals
5. Rapid change core: Avoiding being pulled back into the core business

The role and influence of the contextual factors has been further developed in the discussion chapter.

5.19.3 Contribution 3: Scoping framework guiding organisations on where to look for NPD opportunities

Through synthesising findings from the interview process and the literature, the study has enabled the development of a framework which guides companies when they are choosing where to undertake search and select activities, considering uncertainty in terms of standardised, transitional and fluid or “rapid change” workflows across core, adjacent and breakthrough environments.

5.19.4 Contribution 4: What to look for: Identifying ten key market insights that inform NPD in a HE publishing sector demanding integrated content and service offerings

The author has developed a conceptual model identifying ten key market insight areas that firms in the HE publishing sector need to prioritise during the “What to look for” (stage 4) step in the proposed modified version of Day and Schoemaker’s “Seven steps to bridge the vigilance gap” process.

5.19.5 Extended version of Day and Schoemaker’s “Seven steps to bridge the vigilance gap”

The study has confirmed the validity of Day and Schoemaker’s “Seven steps to bridge the vigilance gap” (2006), and extends their theory through proposing an additional two steps, and recommends extensions to four of the seven steps contained in the original model.

CHAPTER 6: CONCLUSION

6.1 Context

The thesis is concerned with understanding the nature and dynamics of NPD focused innovation, and the contextual influences on the early stages of the innovation process. Innovation takes place in disrupting environments, with organisations challenged to develop a validated range of opportunities across core and beyond the core environments.

As companies operationalise the “fuzzy front end” of innovation, the search funnel can be too narrow, so there is a need for peripheral vision, and selection filters need to be set accordingly.

6.2 The research question and research objectives

The thesis addressed the research question: “How do organisations manage innovation search and select in disrupting environments?”

To mobilise the research question, seven research objectives were established.

Search	Select
Research Objective 1: How do organisations manage innovation search in core markets in disrupting environments?	Research Objective 2: How do organisations manage innovation select in core markets in disrupting environments?
Research Objective 3: How do organisations manage innovation search in adjacent markets in disrupting environments?	Research Objective 4: How do organisations manage innovation select in adjacent markets in disrupting environments?
Research Objective 5: How do organisations manage innovation search in breakthrough areas in disrupting environments?	Research Objective 6: How do organisations manage innovation select in breakthrough areas in disrupting environments?
Research Objective 7: What is the influence of context on the operationalisation of innovation search and select capabilities in disrupting environments?	

Table 6.1: Research objectives

6.3 The research process

To understand how organisations manage search and select in disrupting environments, the author chose to explore the question in the disrupting HE publishing industry using qualitative research methods. The researcher conducted 61 semi-structured interviews with 63 individuals across ten companies. The case companies were selected carefully to explore how a range of HE publishers manage search and select, so that the influence of contextual issues such as the mission and size of the organisation could be evaluated.

Type Of Publisher	Number of Publishers
Large commercial companies	4
Medium commercial companies	2
University owned publishers	2
Society publishers	2
Total	10

Table 6.2: Case sample structure

An organisation's approach to exploit and/or explore innovation affects the whole firm, and so the interviewees were selected from senior leaders to operational managers, ranging from CEOs and other C level roles, to heads of department through to market research specialists. Innovation is cross disciplinary, and so the sample included individuals with overall responsibility for their organisation, as well as extending across CTOs and technology managers, production and operations, editorial and publishing, sales and marketing.

6.4 Contribution 1: The 11 search and select capabilities that need to be in place to manage NPD effectively

The research project focused on NPD activities. The literature review identified 11 key capabilities that organisations need to have in place to manage the fuzzy front end of NPD search and select effectively in HE publishing, within the wider innovation process (Khurana & Rosenthal, 1997), particularly considering the opportunity identification, and idea selection tasks identified by Koen et al (2001). The empirical research process has evaluated the presence of 11 search and select capabilities in the case companies. The data collected through the interviews validated the significance of the capabilities identified through the literature review in enabling NPD focused search and select projects in disrupting environments.

Table 6.3 below identifies the 11 key NPD capabilities, and indicates the literature that supports the inclusion of the capabilities in the research analysis.

Capability required for innovation managed on a Core / Adjacent/ Breakthrough basis	Research findings: Why do organisations need these capabilities?	Key literature influencing inclusion
1) Guided by high level, NPD portfolio driven strategic plan considering core, adjacent and breakthrough opportunities	To avoid getting stuck in the core, firms need a portfolio of options across the core business, and beyond the core business When a portfolio driven strategic plan is in place, it is possible to design the portfolio driven organisation	(Collis & Rukstad, 2008; Cooper et al., 2001; Cooper, 2013; Day, 2007; Klingebiel & Rammer, 2014; McGrath, 2013a; Nagji & Tuff, 2012; Reeves et al., 2015; Urhahn & Spieth, 2014)
2) Search the periphery for innovation & NPD opportunities (breakthrough environments only)	Many organisations lack the capacity to detect and act on weak signals. Vigilance to threats & opportunities in the periphery helps organisations anticipate & respond to signals with the greatest potential impact	(Burt, 2004; Day & Schoemaker, 2004b, 2006, 2008; Fuld, 2003; Prahalad, 2004a; Rossel, 2012; Schoemaker et al., 2013)
3) Operationalise structured search and select processes across core, adjacent and breakthrough opportunities	A portfolio driven strategic plan needs an effective “fuzzy front end” to identify and select opportunities in the core market, and beyond the core	(Brown & Blackmon, 2005; Day, 2007; Heising, 2012; Helfat & Winter, 2011a; Killen & Hunt, 2013; Kortmann et al., 2014; Sull et al., 2015; Tyagi & Sawhney, 2010)
4) Seek out and share deep contextual domain insights, e.g. macro social, industry and technology trends	Organisations need to scope the uncertainty of the future, to provide structured frameworks to inform the development of a future orientated portfolio of opportunities	(Adner, 2013; Bradfield et al., 2005; De Geus, 1988; Dodgson et al., 2006b; Ramírez et al., 2013; Schoemaker et al., 2013; Schoemaker, 1995; Wack, 1985)

5) Seek out and share deep domain insights into user workflows	Through understanding digital user workflows, companies can identify and validate relevant user jobs-to-be-done, and the business models to generate value and revenue from them	(Chatterji & Fabrizio, 2012, 2013; Grönroos, 2011; Jamali et al., 2014; Kozinets, 2002; Lilien et al., 2002; Lüthje & Herstatt, 2004; Mahr & Lievens, 2012; von Hippel, 1986; Xie et al., 2008)
6) Deploy digital era market research techniques (e.g. netnography)	Providers of digital solutions benefit from the deployment of a range of market research techniques to understand fast evolving user needs, budgets, DMU structures and priorities	(Cayla et al., 2014; Cooper & Edgett, 2008; Füller et al., 2006; Goffin et al., 2010; Kozinets, 2013, 2015; McAfee & Brynjolfsson, 2012; Radjou & Prabhu, 2015)
7) Identify and validate "big enough" pervasive problems requiring solutions	In service focused digital markets, organisations benefit from helping customers and users get one or more jobs done. Pervasive problems offer greater opportunities to generate value and revenues than isolated jobs-to-be-done	(Bettencourt & Brown, 2013; Bettencourt, Lusch, & Vargo, 2014; Christensen, Anthony, Berstell, & Nitterhouse, 2007; Christensen, Anthony, & Roth, 2004; Ulwick, 2005)
8) Validate and iterate opportunities through MVP testing and learning	Opportunities require validation, and the early stages of online product development using MVP techniques limit costs, and increase success rates	(Bessant et al., 2005b; Bettencourt & Ulwick, 2008; Blank, 2013; Lynn et al., 1996; Morris et al., 2014; Reeves, Love, & Mathur, 2012; Ries, 2011; Thomke & von Hippel, 2002)
9) Recruit, connect with and learn from individuals outside the firm's core industry	To be successful, companies need staff and networks with a spectrum of skills and experiences. To be successful beyond core markets, different knowledge sets are needed, coupled with the organisational capability to make sense of the new insights, and exploit them	(Burt, 2000, 2004; Dyer et al., 2011; Eggers & Kaplan, 2013; Henderson & Clark, 1990; Kaplan, 2011; Parise et al., 2015; Porac et al., 1989; Whelan et al., 2011; Zahra & George, 2002)
10) Identify and validate external acquisition & investment opportunities	The acquisition of companies and development of alliances are part of the innovation toolkit. The identification and validation of high potential opportunities is a key capability	(Ahuja & Novelli, 2014; R. S. Burt, 2000, 2004; Hargadon & Sutton, 2000; Hargadon, 2003; Miller, 2004; Schilling & Steensma, 2002; Villalonga & McGahan, 2005)
11) Act on analysis, investing in, acquiring, and/or collaborating with external organisations	Disciplined follow through is required to acquire firms, and build mutually beneficial collaboration with other organisations. Does the organisation have the resources, will and integration skills to acquire companies, and/or collaborate with external organisations?	(Adner, 2013; Ahuja & Novelli, 2014; Birkinshaw et al., 2007; Davis & Eisenhardt, 2011; Desyllas & Hughes, 2010; Dyer et al., 2004; Dyer & Singh, 1998; Powell et al., 2005)

Table 6.3: The 11 search and select capabilities that need to be in place to manage NPD effectively

6.5 Contribution 2: The influence of context on the operationalisation of innovation search and select capabilities in disrupting environments

Research Objective 7 raised the question: “What is the influence of context on the operationalisation of innovation search and select capabilities in disrupting environments?” The research process explored how organisations manage search and select in the HE publishing industry, and has identified five contextual variables that influence how search and select is operationalised in disrupting environments:

1. Innovation portfolio management: Structure across core, adjacent and breakthrough opportunities
2. Cognition
3. Ambidexterity
4. Peripheral vision: Being vigilant to weak signals
5. Rapid Change Core: Avoiding being pulled back into the core business

6.6 Contribution 3: Scoping framework guiding organisations on where to look for NPD opportunities

The researcher has developed a framework guiding companies when they are choosing where to undertake search and select activities, considering uncertainty in terms of standardised, transitional and fluid or “rapid change” workflows across core, adjacent and breakthrough environments shown in Figure 6.1. The framework provides the opportunity to map individual projects within a wider NPD portfolio, integrating a range of opportunities.

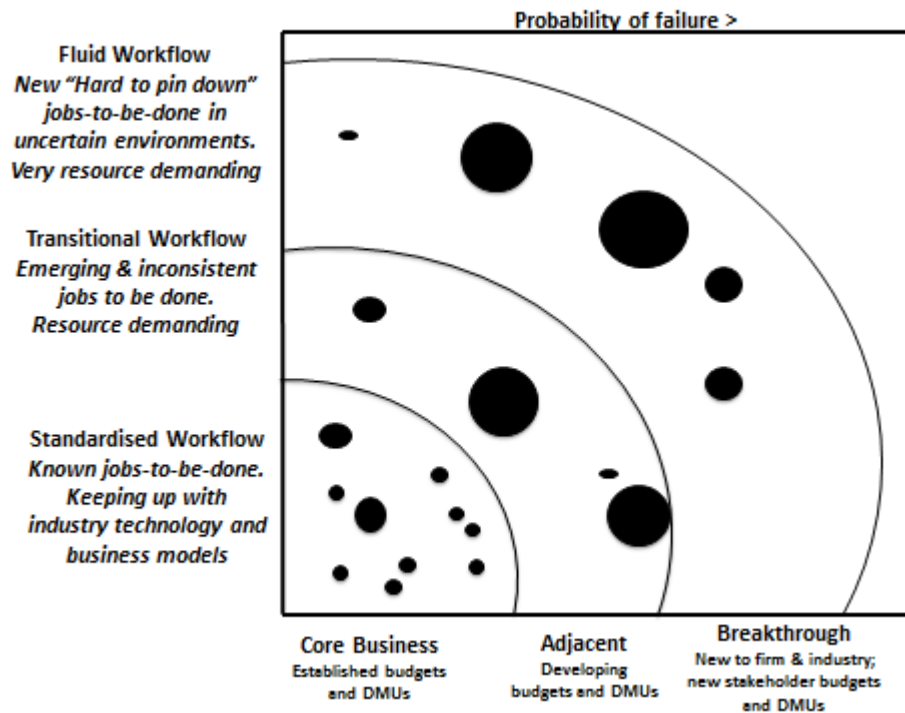


Figure 6.1: Scoping where to look for NPD opportunities across the innovation portfolio considering workflow, jobs-to-be-done and project potential

6.7 Contribution 4: What to look for: Identifying ten key market insights that inform NPD in a HE publishing sector demanding integrated content and service offerings

The researcher proposes a conceptual model that identifies ten key market insight areas where firms in the HE publishing sector need to focus during the “What to look for” (stage 4) step in the proposed extended version of Day and Schoemaker’s (2006) “Seven steps to bridge the vigilance gap” process.

6.8 Extended version of Day and Schoemaker's "Seven steps to bridge the vigilance gap"

The study extends Day and Schoemaker's "Seven steps to bridge the vigilance gap" (2006), through proposing an additional two steps, and recommends extensions to four of the seven steps contained in the 2006 model.

6.9 Implications of the findings for practice

The thesis has relevance for any organisation operating in disrupting environments. The contributions are likely to have the greatest impact in the sectors prioritised below:

1. HE publishers
2. Online media companies
3. B2B service organisations
4. B2C service organisations

6.10 Implications for practice: Capabilities required for NPD managed on a core, adjacent and breakthrough basis

The table below considers how the identification of the 11 key search and select capabilities may have a positive impact on practice.

Capability required for NPD managed on a Core / Adjacent/ Breakthrough basis	Implications for practice
1) Guided by a high level, portfolio driven strategic plan supported by appropriate structures considering core, adjacent and breakthrough	<p>Firms who structure their business on a portfolio basis develop and resource a mix of NPD opportunities, spreading their risk across core, adjacent and breakthrough environments.</p> <p>While most companies strongly prioritise NPD efforts in the core, research demonstrates that firms with a balanced innovation portfolio typically earn stronger returns than firms that do not develop an innovation portfolio.</p> <p>Effective communication of a portfolio strategy enables core market staff to excel at “do better” NPD, and gives staff developing adjacent and breakthrough “do different” opportunities the focus, flexibility, skills, resources and senior level backing they need to explore successfully BTC.</p>
2) Search the periphery for innovation and NPD opportunities (breakthrough environments only)	<p>Peripheral vision helps firms see emerging threats, and recognise opportunities at the edge of their environment, particularly in rapidly changing markets.</p> <p>To shift attention beyond the core market, organisations need to establish different cognitive frames, routines and skill sets to make sense of the periphery.</p> <p>Firms with good peripheral vision gain advantages over competitors, as they recognise and act on opportunities more quickly than rivals, and avoid being blindsided.</p>
3) Operationalise structured search and select processes across core, adjacent and breakthrough opportunities	<p>The operationalisation of structured processes across the portfolio gives the firm the capability to execute search and select, particularly where ambiguity is high beyond the core.</p> <p>Structured search and select processes improve project management, and increase NPD success rates across complex core, adjacent and breakthrough environments.</p> <p>The effective operationalisation of search and select across the portfolio typically requires different structures, metrics, mind sets, processes (e.g. different types of stage-gates), skills and management approaches in the core, and beyond the core.</p>
4) Seek out and share deep contextual domain insights, e.g. macro social, industry and technology trends	<p>Firms with deep domain understanding make better choices through reducing uncertainty.</p> <p>Strategic choices require understanding of broad market and technology trends and less visible undercurrents. Firms also find that deep domain insights into the workings of DMUs, budget holder incentives, industry standards, competitor activity, and the speed of adoption of new industry metrics etc. improve opportunity recognition and evaluation.</p> <p>Insights into the core, and beyond the core, help companies back established markets appropriately, and place bets with improved odds in adjacent and breakthrough environments.</p> <p>Firms will only benefit from these insights through establishing knowledge sharing routines.</p>

5) Seek out and share deep domain insights into user workflows	<p>Providers of digital services need to understand the workflow of their users, otherwise they are likely to segment opportunities poorly, and experience low NPD success rates.</p> <p>Through breaking down the task that the user wants to get done, a company understands the points at which a user would benefit from more help from a service, and the metrics users use to evaluate success.</p> <p>Through understanding digital user workflows, companies can identify and validate relevant user jobs-to-be-done, and the value capture models to generate value from them.</p>
6) Deploy digital era market research techniques (e.g. netnography)	<p>Providers of digital solutions require a range of digital era market research techniques to understand fast evolving user needs, budgets, and changing/new DMU structures and priorities in new markets. Practitioners with access to the research (particularly ethnographic) techniques and data collection capabilities to identify and validate workflows and the potential value capture models required to capitalise on solving problems for users within will enhance their NPD success rate.</p>
7) Identify and validate "big enough" pervasive problems and jobs-to-be-done requiring solutions	<p>Pervasive problems offer greater opportunities to generate value and revenues than isolated jobs-to-be-done.</p> <p>The identification of "big enough" problems focuses attention on opportunities where value can be captured, and which are large enough to be monetised for long enough to be profitable.</p>
8) Validate and iterate opportunities through MVP testing and learning	<p>MVP and agile approaches lower development costs, and shorten the time that firms take to move through the Build-Measure-Learn loop, helping firms to stop weak projects faster, and develop promising opportunities quickly and cheaply.</p> <p>The measure phase secures data to determine whether the NPD effort is solving problems and creating value, which also enables the design of value capture models.</p>
9) Recruit, connect with and learn from individuals outside the firm's core industry	<p>Through recruiting and connecting with individuals with knowledge from outside core markets, firms gain access to the different skills, perspectives and networks that they need to search for and select a balanced portfolio of options beyond the core.</p>
10) Identify and validate external acquisition and investment opportunities	<p>The acquisition of companies and development of alliances are key parts of the innovation search and select toolkit.</p> <p>As companies develop a portfolio of opportunities, they require the capability to identify and validate high potential opportunities.</p>
11) Act on analysis, investing in, acquiring, and/or collaborating with external organisations	<p>Acquisition and/or collaboration can bring in essential capabilities and new opportunities, but only if the firm can mobilise itself to acquire and integrate target organisations effectively, or manage collaborations for mutual benefit.</p>

Table 6.4: Implications for practice: Capabilities required for NPD managed on a core, adjacent and breakthrough basis

6.11 Implications for practice: Five contextual factors influencing the operationalisation of search and select

Table 6.5 below considers the identification of the five contextual factors that influence the operationalisation of search and select, and makes recommendations for practice.

Contextual influences	Implications for practice
Innovation portfolio management: Structured across core, adjacent and breakthrough opportunities	<p>Firms benefit from the development of a portfolio driven strategic plan. Companies need to develop and operationalise a portfolio designed organisation to mobilise the portfolio driven strategy.</p> <p>The effective communication of the portfolio strategy and structure needs to be supported through the visualisation and communication of the strategy and supporting organisational structure.</p>
Cognition	<p>The attention of the firm is strongly influenced by the visible priorities of leaders. If the firm wants to develop a portfolio driven business, the behaviours of leaders need to demonstrate this.</p> <p>Organisations will need to recruit and develop leaders and managers with wide cognitive frames and the capacity to make sense of unfamiliar or disruptive discoveries across the opportunity portfolio.</p> <p>Organisations need to be structured and resourced to apply different cognitive frames to different parts of the opportunity portfolio.</p>
Ambidexterity	<p>A firm needs to be able to answer the question: “How are we going to be able to exploit the core business, and explore opportunities beyond the core?”</p> <p>Companies need to manage the tensions implicit in doing two different things, in the core and beyond the core, making trade-offs between short- and long-term demands.</p> <p>Companies need to choose the right structural approach for core, adjacent and breakthrough opportunities, and in one size does not fit all.</p> <p>Different skills and experience are needed for do-better and do-different activities.</p> <p>Senior level leaders have to be able to manage the ambiguity implicit in managing a portfolio firm and corresponding networks.</p>
Peripheral vision: Being vigilant to weak signals	<p>Practitioners need to look at the periphery in terms of opportunity identification, as well as risk management.</p> <p>Opportunities beyond the core need to be framed as the “next business”, rather than a worrying source of uncertainty and cost.</p> <p>Digital era research and decision making capabilities are needed to make sense of the periphery, supported by different routines and skills from the core.</p>
Rapid Change Core: Avoiding being pulled back into the core business	<p>The phrase “core business” can suggest “unchanging and routine business”, but this is often not the case in technology enabled and disrupting core markets.</p> <p>The language chosen to communicate the notion of the “rapid change core” will help practitioners acknowledge the demands of keeping up in core markets.</p> <p>Use of the phrase “rapid change core” will motivate practitioners to spread their bets and adopt portfolio approaches, breaking out of the “rapid change core” to seek new opportunities in adjacent environments, even if breakthrough opportunities are more the preserve of entrepreneurs and appropriately organized corporate venture units.</p>

Table 6.5: Implications for practice: Five contextual factors influencing the operationalisation of search and select

6.12 Implications for practice: Ten key market insights that inform NPD in a HE publishing sector demanding integrated content and service offerings

Table 6.6 below reflects on how the ten key market insights that inform NPD in the HE publishing sector help practitioners to identify the information that will help them to build their value proposition across a portfolio of business opportunities. The further from core markets a company explores, the more diverse and less understood the workflows and jobs-to-be-done will be. Practitioners will need to explore a range of workflows to identify where they are best placed to deliver value, and how they can use a range of business models to capture value and generate profits.

What to look for: 10 Key Market Insights that inform NPD	Implications for practice
1) Ecosystem influences	<p>Before allocating resources to opportunities, organisations need to understand the ecosystem to answer the following questions:</p> <p>“Which social, technological, and governmental factors influence a market environment?”</p> <p>“Who else needs to innovate for my innovation to matter”</p> <p>“Who else needs to adopt my innovation before the end customer can assess the full value proposition?”</p> <p>“What does it take to deliver the right innovation on time, to specification, to beat the competition?”</p>
2) Standardised workflow	<p>Practitioners can use market segmentation by workflow type to structure their NPD search and select activities across standardised (core), transitional and fluid workflows.</p> <p>Organisations work to understand standardised workflows in core markets, keeping up with standard industry technologies and business models.</p> <p>Workflow focused activities to identify jobs-to-be-done will be less resource demanding in well understood core markets than beyond the core.</p> <p>The key benefit to practitioners is that they will focus their resources on supporting the jobs-to-be-done that users and DMUs value the most, and are ready to pay for.</p>
3) Transitional workflow	<p>Transitional workflows will be found where standardised workflows are being changed by new technology or other factors, and in environments which are new to companies, in adjacent and consolidating markets.</p> <p>To understand transitional workflow, organisations must be ready to deal with inconsistent, fragmented and changing knowledge sets.</p> <p>Without an understanding of transitional workflows, resource allocation decisions will be made without knowledge of the jobs-to-be-done that users and DMUs value the most, and are ready to pay for.</p>

4) Fluid workflow	<p>Fluid workflows are found at the leading edge of core, adjacent and breakthrough environments.</p> <p>To understand fluid workflows, organisations need to be prepared to acquire new knowledge in uncertain environments, as understanding emergent, “hard to pin down” workflows is time and resource demanding.</p> <p>Without an understanding of fluid workflows, resource allocation decisions will be made without knowledge of the jobs-to-be-done that users and DMUs value the most, and what organisations might be ready to pay for.</p>
5) Jobs-to-be-done	<p>Firms need to understand how value is created by users within organisations.</p> <p>Through understanding the jobs-to-be-done by digital users and work groups, and the measures used by users and customers to assess if the jobs have been completed successfully, firms can identify multiple innovation opportunities for making jobs simpler, easier or faster.</p>
6) Pervasive problems	<p>Firms need to identify the pervasive problems that are big enough to justify resource allocation, as compared to alternative opportunities.</p> <p>Managers will need to assess the transience of the problem, i.e. is there enough time to make money out of solving the problem?</p>
7) Budgets to target	<p>Where organisations are prepared to pay for solutions supporting emerging or changing jobs-to-be-done, the budgets available to pay for the services will often be located in unfamiliar parts of organisations.</p> <p>Organisations need to identify where the budgets are located to pay for their new value propositions.</p> <p>Firms need to assess if the budgets and financial opportunity are big enough to warrant resource allocation, as compared to alternative opportunities?</p> <p>Firms need to establish how expensive it will be to access emergent budgets, and how quickly will pay for new offerings?</p>
8) Value metrics (facts)	<p>Companies need to identify the data – or facts – that demonstrate the value that a company is delivering to support a job-to-be-done, which in turn enables the development of value propositions and value capture.</p>
9). Value capture	<p>The most significant value capture challenges facing practitioners concerning transitional and fluid workflow based opportunities are connected with the question: “What quantifiable service can we invoice for?” (Even when micro-payments are involved)</p>
10) DMU structure, and the influences on the buying decision	<p>Firms need to identify current and emergent DMU structures, what influences the DMUs internally, and what influences them within the ecosystem (see ecosystem influences above).</p>

Table 6.6: Implications for practice: “What to look for: Key market insights that inform NPD”

6.13 Implications for theory

This thesis confirms the relevance and explanatory power of key elements of the strategy and innovation management literature, especially McGrath's research on transient competitive advantage, Day and Schoemaker's studies into peripheral vision, Day and Cooper's work on portfolio management, Tellis and Kaplan on cognition and organisational culture within incumbent firms, Birkinshaw on ambidexterity, Utterback and Abernathy on the innovation lifecycle, and Ulwick and Bettencourt on outcomes driven innovation and jobs-to-be-done.

6.13.1 Contribution 1: The 11 search and select capabilities that need to be in place to manage NPD effectively

The 11 capabilities were identified through the literature review as being particularly supportive to the management of NPD focused search and select activities. The capabilities are concerned with sensing needs and opportunities, and supporting the seizing of attractive possibilities, and represent a synthesis of relevant capabilities from the literature.

The significance of these capabilities to the HE publishing case companies, and particularly to the firms with the greatest degree of preparedness to search for and select NPD opportunities across core, adjacent and breakthrough environments, was confirmed through assessing the presence of these capabilities across the sample.

6.13.2 Contribution 2: The influence of context on the operationalisation of search and select capabilities in disrupting environments

The findings confirm the influence of a synthesis of five contextual factors (innovation portfolio management, cognition, ambidexterity, peripheral vision and the rapid change core) on the operationalisation of NPD search and select capabilities in HE publishing. The contextual factors with the greatest influence on the case companies are all drawn from the relevant innovation, strategy and knowledge centred literature.

6.13.3 Contribution 3: Scoping framework guiding where to look for NPD opportunities

The proposed scoping framework synthesises existing literature focused on mapping innovation and NPD portfolios with Utterback and Abernathy's innovation life cycle model (1975).

6.13.4 Contribution 4: What to look for: Identifying ten key market insights that inform NPD in a HE publishing sector demanding integrated content and service

The identification of the ten market insights represents a synthesis of the relevant literature, with the selection of the ten key areas of market insight for HE publishers informed by the literature review and interviews with the case companies.

6.13.5 Modified version of Day and Schoemaker's "Seven steps to bridge the vigilance gap"

The research project confirms the validity of Day and Schoemaker's "Seven steps to Bridge the vigilance gap" (2006), and extends their theory through proposing a modified nine step version containing an additional two steps, with extensions recommended to four of the seven steps contained in the original model. The thesis extends the peripheral vision and organisational vigilance literature, with the modified model considering how organisations search for and select opportunities in the periphery in the turbulent digital era, which has changed significantly since the original model was proposed in 2006.

6.14 Further research

While more limited further research could be proposed to validate the contributions generated through this exploratory study, using large sample quantitative research methods, the researcher has opted to propose a number of more ambitious avenues for further research that would build on the findings and contributions from the project.

6.14.1 Further research option 1: How do the cognitive frames of Boards and Senior Teams affect the structure and operationalisation of NPD portfolios?

The purpose of exploring the research question above would be to understand what affects the strategic decisions taken by boards and senior teams regarding the development of NPD portfolios. The research objectives could consider:

- What affects the decisions that establish or fail to establish portfolio structures?
- What affects appointments to senior roles in adjacent and breakthrough sectors, as compared to the core?
- How do Boards/senior teams make sense of unfamiliar environments?
- How do Boards/senior teams make decisions regarding unfamiliar environments?
- How do Boards/senior teams build networks that inform them about unfamiliar environments?
- How do Boards/senior teams allocate time between core, adjacent, and breakthrough focused divisions?

The research design could include qualitative, semi-structured interviews with senior individuals. Deeper insights would be generated through working with social psychologists skilled in observing group behaviour, to observe board and senior level meetings, to assess the weighting of time, resource allocation, and contextual influences on decisions affecting the operationalisation of the portfolio driven organisation. The assessment of board and senior team meeting minutes would also be used.

The study could be expanded through working with networks of organisations in core, adjacent and breakthrough business sectors. The objective would be to analyse how different players in a network build understanding of unfamiliar environments. The research project would increase understanding of how networks operate in unfamiliar environments, rather than just analysing focal or individual firms as they explore beyond the core.

6.14.2 Further research option 2: How do visual media companies search for, develop (ideate) and select programme and film projects in the disrupting media sector?

In the era of the Internet of Things, when visual media consumption and distribution is changing rapidly, the project would seek to understand how the programme and film ideation and validation processes (search and select) operate in a multi-device world. The project would consider the data that programme makers and funders use (building on the “What to look for” contribution) when making selection decisions.

The research design would include qualitative, semi-structured interviews with senior individuals within the visual media ecosystem including:

- Free to air broadcasters (e.g. ITV; BBC; Channel 4)
- Independent producers for small screen and cinematic release
- Investors
- Distributors
- Emerging programme commissioners such as Netflix, Amazon, and Sky

Rich data could also be generated through observing key meetings covering ideation, pitches, and post screening/transmission evaluation. The visual media industry is a major UK employer and exporter, with research funding available for research into digital media.

6.14.3 Further research option 3: How are workflow mapping and the identification of jobs-to-be-done deployed within the NPD process?

The purpose of the research would be to identify the role of workflow mapping and jobs-to-be-done techniques in NPD considering known areas of activity such as software development, and less explored areas such as education, training, visual media, audio and digital books. The project would aim to identify:

- How workflow mapping and the jobs-to-be-done opportunity recognition and evaluation approach is used within both B2B and B2C environments
- When workflow mapping and jobs-to-be-done search and select tools are deployed, what factors have influenced their adoption?
- How effective are workflow mapping and jobs-to-be-done search and select tools in NPD?
- What measures of value are most effective when evaluating opportunities developed using the jobs-to-be-done approach?

The methodology could include

- Exploratory qualitative semi-structured interviews with innovation, NPD and market research staff
- Quantitative survey of innovation, NPD and market research staff incorporating learning from the qualitative stage of the project

6.15 Limitations and major learning points

While two practice interviews were conducted with a small scholarly publisher before the main data collection phase to gauge the appropriateness and effectiveness of the interview structure, the study would have benefited from an initial survey, which in turn could have shortened the interview structure, and improved question design.

Due to the exploratory nature of the research with only 63 respondents and 61 interviews, the use of qualitative research methods, and the research project being focused on one particular industry, it is not possible to generalise from the findings. The contributions would have been strengthened if validated through a quantitative survey conducted with HE publishers, or in other industries.

Only 10 publishers took part, publishing 9,000 journals out of the world's 32,000 journals (22,000 journals covered by the Scopus database, and an additional 10,000 or so peer reviewed journals not covered by Scopus (Ware & Mabe, 2015: 45)). The literature review considered 27 different themes relevant to innovation, and the discussion ranges relatively broadly, and possibly too ambitiously.

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APPENDICES

Appendix 1: Sample letter used to secure access to case companies

Focusing on the Future: How HE Publishers Sense and Respond to Disruptive Innovation Signals: X

Bill Russell, a Director of Emerald Group Publishing Ltd from 2000 – 2012, is conducting research into how publishers identify and prioritize innovation opportunities within uncertain HE (Higher Education) environments.

Context

HE leaders and staff are assessing what they need from their partners and suppliers, such as publishers. The following trends are pushing colleges and universities to change and innovate:

- Revenue challenges (costs are going up, government funding is going down, and competition is increasing)
- Students are becoming more demanding, as they seek value for money and employability
- Increased digitization of the teaching and research processes
- Changing assessment methods, with fewer essays relying on textbooks and journal articles
- Globalisation

The scholarly publishing sector has already transformed itself from a paper based world, to the flexible provision of digital journals, books and analytic services. To compete and win in the expanding - and fragmenting - global HE environment, publishers need to innovate and respond to changing stakeholder needs.

Through over 50 confidential face to face interviews with Directors and Managers at leading scholarly publishers (and I hope XXXX), I am exploring how they sense and respond to innovation signals in their core markets, and identify opportunities beyond their core environments – the environments where disruptive challenges emerge and new opportunities develop.

The study is informed by my experience as a Director of Emerald Group Publishing, and is guided by Professors John Bessant (previously at Imperial) and Steve Brown (previously at Bath), leading innovation scholars at the Centre for Innovation and Service Research at Exeter University Business School. Bill also continues to work with the CIBER Research group, having researched and published with David Nicholas and Anthony Watkinson for over 12 years.

My Request?

I would like to interview 6 or so Directors and Senior Managers within (XXXX) individually, across different professional disciplines, so that a full picture can be established of how innovation activities are managed within scholarly and HE publishers.

Academic Protocol: Anonymity for (XXXX), and (XXXX) Employees

Normal academic protocols will be observed, and the names of organisations and individuals will be anonymized in the PhD thesis, reports, articles and book chapters flowing from the research project.

Responses from the publisher staff will be merged with others, when reported. Comments will not be attributed to individuals or organisations

All interviewees will sign an Interview Consent Form, binding the researcher to respect academic protocols in this area.

What Will (XXXX) Receive In Return?

- Insight from a rigorous study into innovation in the scholarly publishing sector, particularly considering how to pick up innovation signals and triggers from the digital periphery beyond the core business, where traditional innovation and market research techniques are challenged
- Through the interview process, you, along with other Directors and Senior Managers, will reflect on innovation and new product development processes at (XXXX), during hour long individual sessions involving around 6 or so staff through face to face interviews
- A PowerPoint presentation focused on (XXXX), providing insights into how your staff see the organisation's innovation process
- An anonymized Scholarly Publishing Innovation Report, summarizing how innovation activities are undertaken in the sector, and what techniques are particularly valued
- A follow up contact with the Group Strategy Committee or other senior group, to discuss both the (XXXX) focused PowerPoint presentation, and the Scholarly Publishing Innovation Report
- The reassurance that this academic research project is being undertaken by an experienced industry manager, now working within the respected Centre for Innovation and Service Research at Exeter University Business School
- No charge, as this is part of an academic research process

Next Steps

I look forward to discussing this opportunity on the phone with you (probably the logical first step), or through a meeting. Following this discussion, my aim is to establish dates for a couple of days of interviews with you(XXXX) Directors and Senior Managers, along with a follow up date to discuss my findings with the appropriate senior team.

Bill Russell
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Exeter University Business School
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Appendix 2: List of the job roles interviewed, by case company

Case	Type of Publisher	Roles Interviewed
Case A	Large commercial	MD MD Director of Market Insight Director of Professional Innovations Director of Product Management VP Publishing Director
Case B	Large commercial	VP Head of Strategic Projects Director, Software Development
Case C	Large commercial	Global Publishing Director Head of Research and Business Intelligence Editorial Director Director - Open Access Digital Products Director
Case D	Large commercial	MD MD Director Head of Department Head of Department
Case E	Medium commercial	President Head of OA Publishing Global Publishing Director Editorial Director Executive Product Manager Product Manager
Case F	Medium commercial	CEO CEO Chief Officer, Content Management Head of Product Management Chief Officer, Business & Product Innovation CTO Chief Publishing Officer MD Publishing Director Marketing Services Manager PR & Communities Manager SVP

Case G	University owned	Executive VP Director Director VP Sales and Marketing
Case H	University owned	MD Platform Technologies Director Director of Publishing Publishing Director Global Marketing Director Sales Director Senior Sales Development Manager Head of Market Analysis and Brand Development Digital Publishing Director Managing Editor Global Production and Operations Director
Case I	Society publisher	Commercial Director Publisher Head of Publishing Operations ePublishing Manager
Case J	Society publisher	MD CTO Head of Publishing Head of Product Management and Innovation Editorial Director Commercial Director

Appendix 3: Interview Structure

Interview Structure
1. Opening comments
2. Interviewee Name?
3. Interviewee Title?
4. How long have you been with the publisher?
5. How long have you been in publishing?
6. Can you help me to understand the organisation?
7. Major changes in the company in the last 5 years?
8. Major changes in the sector in the last 5 years?
9. Can you tell me about the Core Business?
10. What Makes the Core Business Successful?
11. What is the core business of the company?
12. Why do people buy from the company?
13. In the core business, how does the organisation identify opportunities for innovation?
14. What particularly influences the innovation and product development process?
15. What particularly influences which innovation projects are selected for further development?
16. Is it clear who is responsible for searching for innovation and new product development (NPD) opportunities in the core business?
17. Does the organisation have an effective knowledge management, or other system, to support innovation and NPD processes in the core business?
18. How does the organisation operate beyond the core business? What makes it successful beyond the core business?
19. What do staff get rewarded for beyond the core business?
20. How does the organisation view failure, beyond the core?
21. Beyond the core business, how does the organisation identify opportunities for innovation?
22. What particularly influences the innovation and product development process beyond the core business?
23. What particularly influences which projects are selected for further development beyond the core business?
24. Is it clear who is responsible for searching for innovation and new product development (NPD) opportunities, beyond the core business?
25. Does the organisation have an effective knowledge management, or other system, to support innovation and NPD processes beyond the core business?
26. Does the organisation have a systematic way of searching the periphery of your business environment for innovation and NPD opportunities?
27. How does the organisation respond to surprises? Do you have some examples?
28. Let's imagine that it is 2018. What will be the most important activities, routines or approaches that the organisation will need to have in place to successfully manage innovation and NPD in the core business?
29. Let's imagine that it is 2018. What will be the most important activities, routines or approaches that the organisation will need to have in place to successfully manage innovation and NPD beyond the core business?

Appendix 4: Interview Consent Form

How Academic Publishers Sense and Respond to Disruptive Innovation Signals

The study explores how Academic Publishers sense and respond to innovation signals in their core markets, and identify opportunities beyond their core environments – the environments where disruptive challenges emerge and new opportunities develop.

Thank you for agreeing to be interviewed for this project.

I wish to confirm that:

- Interviews are confidential and anonymised so participants cannot be identified individually from the data.
- Where interviews are recorded and/or transcribed they will be coded in order to protect the identity of respondents. All files will be stored securely in accordance with the UK Data Protection Act.
- Any quotations and/or examples used in research outputs (such as reports, conference papers, presentations, etc.) will remain anonymous.
- Participation in this research is entirely voluntary. Participants are free to refuse to answer any question or terminate the interview at any point.

If you have concerns or queries about any aspect of this project please speak to a member of the research team.

Participant Signature

XXX YYYY

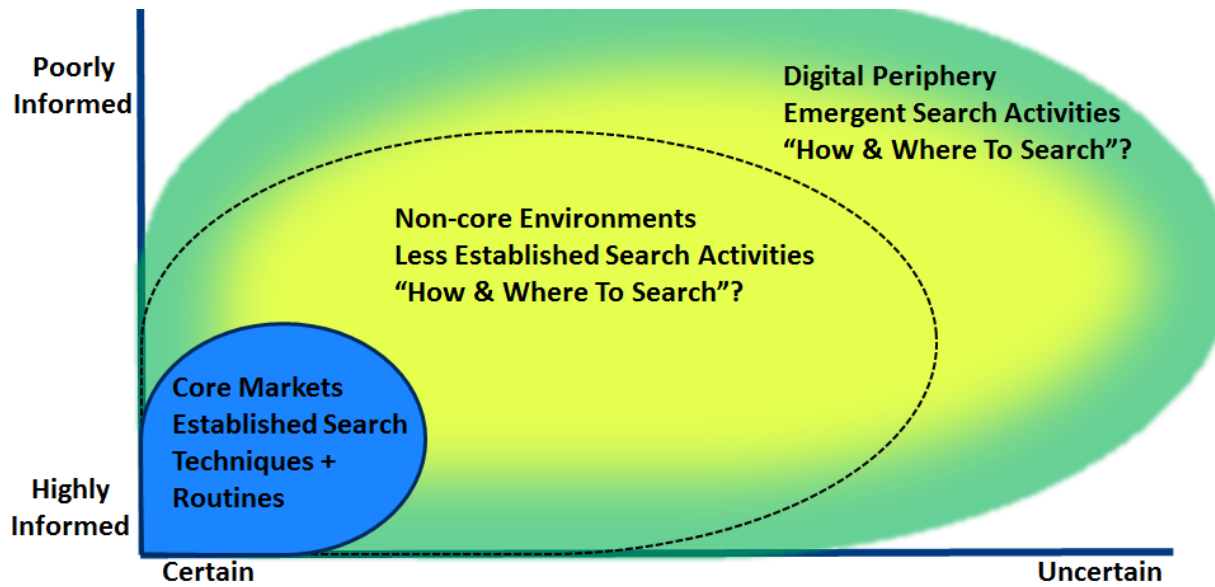
Date:

Researcher Signature

Bill Russell

Date:

Appendix 5: Innovation Search: Core, Non-core and Digital Periphery 2014 – 2020



Appendix 6: Case Analysis Template

Innovation Search and Select Capabilities: What Does A HE Publisher Need To Be Able To Do?	Case Company A				3: Capability well established, with consistent and clear references to ongoing activities 2: Capability present, with some references to ongoing activities 1: Capability partially/patchily present, with limited supporting references to ongoing activities 0: No supporting references regarding current activities	
	Core	Core	Adjacent	Adjacent	Breakthrough	Break-through
	Capability Evidence	Capability Rating	Capability Evidence	Capability Rating	Capability Evidence	Capability Rating
1) Guided by high level, NPD portfolio driven strategic plan considering core, adjacent and breakthrough opportunities						
2) Search the periphery for innovation & NPD opportunities (breakthrough environments only)	N/A	N/A	N/A	N/A		
3) Operationalise structured search and select processes across core, adjacent and breakthrough opportunities						
4) Seek out and share deep contextual domain insights, e.g. macro social, industry and technology trends						
5) Seek out and share deep domain insights into user workflows						
6) Deploy digital era market research techniques (e.g. netnography)						

7) Identify and validate "big enough" pervasive problems and jobs-to-be-done requiring solutions						
8) Validate and iterate opportunities through MVP testing & learning						
9) Recruit, connect with and learn from individuals outside core industry						
10) Identify & validate external acquisition & investment opportunities						
11) Act on analysis, investing in, acquiring, and/or collaborating with "different thinking" external organisations						

Appendix 7: Responsibilities and length of service

Case Company	Responsibilities Across Whole Organisation/Core / Adjacent/ Breakthrough	Job Title	Yrs at Firm	Yrs in Publishing
Case A	Adjacent	<i>MD</i>	24	24
Case A	Core + Adjacent	<i>MD</i>	17	27
Case A	Core + Adjacent	<i>Director of Market Insight</i>	13	13
Case A	Core + Adjacent	<i>Director of Professional Innovations</i>	15	15
Case A	Core + Adjacent	<i>Director of Product Management</i>	8	15
Case A	Core + Adjacent	<i>VP</i>	30	30
Case A	Core	<i>Publishing Director</i>	18	25
Case A: Sub Total			125	149
Case A: Average			17.9	21.3
Overall Sample Average			10.3	17
Case Company	Responsibilities Across Whole Organisation/Core / Adjacent/ Breakthrough	Job Title	Yrs at Firm	Yrs in Publishing
Case B	Breakthrough	<i>VP</i>	1.5	1.5
Case B	Breakthrough	<i>Head of Strategic Projects</i>	2	2
Case B	Core + Adjacent	<i>Director, Software Development</i>	3	12
Sub Totals			6.5	15.5
Average			2.2	5.2
Overall Sample Average			10.3	17
Case Company	Responsibilities Across Whole Organisation/Core / Adjacent/ Breakthrough	Job Title	Yrs at Firm	Yrs in Publishing
Case C	Across Whole Organisation	<i>Global Publishing Director</i>	27	36
Case C	Core + Adjacent	<i>Head of Research and Business Intelligence</i>	10	15
Case C	Core + Adjacent	<i>Editorial Director</i>	9.5	18
Case C	Adjacent	<i>Director - Open Access</i>	2	18
Case C	Core + Adjacent	<i>Digital Products Director</i>	4	22
Sub Totals			52.5	109
Average			10.5	21.8
Overall Sample Average			10.3	17

Case Company	Responsibilities Across Whole Organisation/Core / Adjacent/ Breakthrough	Job Title	Yrs at Firm	Yrs in Publishing
Case D	Adjacent	<i>MD</i>	20	20
Case D	Breakthrough	<i>MD</i>	18	18
Case D	Breakthrough	<i>Director</i>	1.5	1.5
Case D	Breakthrough	<i>Head of Department</i>	5.5	7.5
Case D	Adjacent	<i>Head of Department</i>	9	9
Sub Totals			54	56
Average			10.8	11.2
Overall Sample Average			10.3	17
Case Company	Responsibilities Across Whole Organisation/Core / Adjacent/ Breakthrough	Job Title	Yrs at Firm	Yrs in Publishing
Case E	Across Whole Organisation	<i>President</i>	28	38
Case E	Core + Adjacent	<i>Head of OA Publishing</i>	15	23
Case E	Across Whole Organisation	<i>Global Publishing Director</i>	25	25
Case E	Across Whole Organisation	<i>Editorial Director</i>	30	30
Case E	Core + Adjacent	<i>Executive Product Manager</i>	5	8
Case E	Adjacent	<i>Program Manager</i>	1	9
Sub Totals			104	133
Average			17.3	22.2
Overall Sample Average			10.3	17
Case Company	Responsibilities Across Whole Organisation/Core / Adjacent/ Breakthrough	Job Title	Yrs at Firm	Yrs in Publishing
Case F	Across Whole Organisation	<i>CEO</i>	6	6
Case F	Core	<i>Chief Officer, Content Management</i>	3	20
Case F	Core + Adjacent	<i>Head of Product Management</i>	15	15
Case F	Adjacent	<i>Chief Officer, Business & Product Innovation</i>	3	17
Case F	Across Whole Organisation	<i>CTO</i>	4	10
Case F	Core	<i>Chief Publishing Officer</i>	1	13
Case F	Core	<i>MD</i>	10	10

Case F	Across Whole Organisation	<i>Publishing Director</i>	3	19
Case F	Core	<i>Marketing Services Manager</i>	3	3
Case F	Core	<i>PR & Communities Manager</i>	2	2
Case F	Adjacent	<i>CEO, Research Media</i>	12	12
Case F	Core	<i>SVP</i>	1	30
Sub Totals			63	157
Average			5.3	13.1
Overall Sample Average			10.3	17
Case Company	Responsibilities Across Whole Organisation/Core / Adjacent/ Breakthrough	Job Title	Yrs at Firm	Yrs in Publishing
Case G	Across Whole Organisation	<i>Executive VP</i>	21	21
Case G	Core + Adjacent	<i>Director</i>	9	9
Case G	Core + Adjacent	<i>Director</i>	8	15
Case G	Core + Adjacent	<i>VP Sales and Marketing</i>	11	21
Sub Totals			49	66
Average			12.3	16.5
Overall Sample Average			10.3	17
Case Company	Responsibilities Across Whole Organisation/Core / Adjacent/ Breakthrough	Job Title	Yrs at Firm	Yrs in Publishing
Case H	Across Whole Organisation	<i>Managing Director</i>	0.5	22
Case H	Across Whole Organisation	<i>Platform Technologies Director</i>	18	18
Case H	Core	<i>Director of Publishing, Social Sciences</i>	21	21
Case H	Core	<i>Publishing Director</i>	12	22
Case H	Core	<i>Global Marketing Director</i>	6	20
Case H	Core	<i>Sales Director</i>	2	10
Case H	Core	<i>Senior Sales Development Manager</i>	5	7
Case H	Core	<i>Head of Market Analysis and Brand Development</i>	1	15
Case H	Core	<i>Digital Publishing Director</i>	25	29
Case H	Core	<i>Managing Editor</i>	11	11
Case H	Core	<i>Global Production and Operations Director</i>	5	18
Sub Totals			106.5	193
Average			9.7	17.5

Overall Sample Average			10.3	17
Case Company	Responsibilities Across Whole Organisation/Core / Adjacent/ Breakthrough	Job Title	Yrs at Firm	Yrs in Publishing
Case I	Across Whole Organisation	<i>Commercial Director</i>	8	23
Case I	Core + Adjacent	<i>Publisher</i>	18	18
Case I	Core + Adjacent	<i>Head of Publishing Operations</i>	19	19
Case I	Core + Adjacent	<i>ePublishing Manager</i>	2.5	9.5
Sub Totals			47.5	69.5
Average			11.9	17.4
Overall Sample Average			10.3	17
Case Company	Responsibilities Across Whole Organisation/Core / Adjacent/ Breakthrough	Job Title	Yrs at Firm	Yrs in Publishing
Case J	Across Whole Organisation	<i>MD</i>	5	37
Case J	Across Whole Organisation	<i>CTO</i>	9	20
Case J	Core + Adjacent	<i>Head of Publishing</i>	2	15
Case J	Core + Adjacent	<i>Head of Product Management and Innovation</i>	3.5	20
Case J	Across Whole Organisation	<i>Editorial Director</i>	18	18
Case J	Across Whole Organisation	<i>Commercial Director</i>	4	16
Sub Totals			41.5	126
Average			6.9	21
Overall Sample Average			10.3	17
SAMPLE TOTALS			649.5	1074