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**A Framework for Understanding the Role of Business-IT Alignment in
Organisational Agility**

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CERTIFICATE OF ORIGINAL AUTHORSHIP

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as part of the collaborative doctoral degree and/or fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

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Abstract

The modern organisation finds itself in a complex dynamic environment. New forces in the marketplace such as globalisation and the digital economy have increased the need for rapid adaptation just to stay in business. These forces are juxtaposed with regulatory environments of increasing complexity that act to constrain the notion of the free market economy. How organisations respond to these conditions has occupied researchers across multiple disciplines. Then there is the role of technology. Information systems scholars have for a long time sought to understand the concept of business and technology “alignment”, and even if such an idea still has relevance in the fast-moving digital world. What is clear is that virtually all large organisations, that use technology as a core business enabler, face a compelling set of circumstances as they seek to constantly adapt their business models and associated technology underpinnings to new commercial imperatives. How this organisational agility is created and maintained, is the subject of this thesis.

Whereas a wealth of multi-disciplinary research perspectives has created a significant body of extant work, there is a lack of a coherent, granular model of the organisational mechanisms that give rise to (or constrain) agility and particularly one that explicates the role of technology. This presents an opportunity for the development of a novel theoretical artefact that would make a contribution not only in theoretical terms, but also be of practical benefit to business and IT managers.

A theoretical model is developed that provides a conceptual bridge between the exogenous organisational environment that generates a need for change, and the internal organisational “machinery” – the people, the processes and the technology - that need to be reconfigured and redirected to achieve the new organisational imperatives. The timeliness of being able to achieve this change, and the constraints that operate on it, being the essence of the organisation’s agility. A cross-disciplinary approach is taken that draws on from management and organisational science as well as information systems research. These perspectives are used to conceptualise the organisation in terms of socio-technical building blocks that admit a richer human behavioural dimension into understanding how technology is used operationally. The theoretical framework is then evaluated and refined with data drawn from three interpretive empirical case studies, representing three industry sectors.

The implications of the developed framework on understanding the microfoundations of organisational agility are discussed. In particular, by characterising the organisation in terms of an ecosystem of adaptive components, agility can be understood as an emergent phenomenon.

This research project contributes a new theory of organizational agility in two respects. Firstly, it provides a novel multi-level microfoundational model in terms of granular, socio-technical building blocks which specifically recognises the human behavioural role in the macro-level phenomenon of agility. Secondly, by elucidating microfoundational mechanisms, the theory defines a stronger causality model for the explanation of organizational agility phenomena. In addition, the research contributes to managerial practice by framing the “organisational agility problem” in terms of lower level, but familiar, management concepts such as business processes and the role of IT at the process level. By characterising the dependencies and interactions between the adaptive elements of the organisational ecosystem, this perspective provides the opportunity for understanding the consequences of management inventions, including those that might not be intended.

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1 Introduction

Modern organisations are more reliant on IT than ever. In the modern, dynamic business environment much is made of the need for organisational agility and the role IT plays as a contributor to this attribute (e.g. Sambamurthy, Bharadwaj & Grover 2003; Zammuto et al. 2007; Weerdts et al. 2012). However, modern organisations are also faced with an ever burgeoning IT applications portfolio, both in size and complexity (Rettig 2007). This intrinsically creates problems for organisational agility as there is an increasing need to respond to environmental change and at the same redeploy (or deploy new) IT functionality from the existing complex IT applications portfolio. In doing this, organisations are faced with not only technical challenges involving application architecture, but also socio-technical issues that go to the heart of how technology is used operationally in organisational processes to deliver the new or changed capability. How easy or otherwise it is for the organisation to make changes across these “layers” is the focus of this research project.

Agility is characterised as an organisation's ability to identify, seize and exploit opportunities more quickly than its competitors (Sull 2009). The research agenda in this field has included what agility means in terms of organisational design (e.g. Jacobs et al. 2011), the capabilities agile organisations need to possess (e.g. Helfat & Winter 2011; Sull 2009) and the role of technology in agility (e.g. Sambamurthy et al. 2003; Lu & Ramamurthy 2011; Queiroz 2015; Tallon & Pinsonneault 2011; Zammuto et al. 2007). Notwithstanding the extent of this prior work, there remain some questions to be addressed. Whereas agility has been found in general to be a positive attribute for firm performance (Sambamurthy et al. 2003) the necessary ingredients for agility and the *mechanisms* that give rise to agility have been more difficult to discern (Chen et al. 2014; Tallon & Pinsonneault 2011). As Tallon puts it: “The critical alignment lesson for companies is this: Increased strategic alignment will improve IT's value to the business, but only if the company is wired flexibly enough to react to sudden business change” (2003, p.2).

The goal of this thesis is to develop a conceptual yet practical framework to gain a better understanding of this “*organisational wiring*” and what the contingencies are that determine the ability of the organisation to adapt to business change. More specifically, recognising that organisations are as much cultural as mechanistic phenomena (Morgan 1997), how do we accommodate the “soft” and “hard” aspects of the organisation into a consistent model of organisational wiring? What new insights into the microfoundations of organisational agility can be provided by such a model? And, what are the ensuing implications for business and IT managers?

1.1 What is a Framework?

A range of research disciplines is evident and potentially relevant to the issue of organisational agility and the role of technology. In management science, the resource based view of the firm (Wernerfelt 1984; Barney 1991) has given rise to the theories of how organisations leverage their resource bases to produce value, such as with organisational capabilities (Helfat 2000; Helfat & Peteraf 2003); how they change their resource bases in response to external adaptive pressure, such as with dynamic capabilities (Teece & Pisano 1994; 1997; Teece 2007). On the other hand, organisational science has emphasised subjective practice over mechanical determinism such as with organisational routines (Feldman & Pentland 2003; Pentland & Feldman 2005) and technology affordances (Zammuto et al. 2007; Leonardi 2011). In addition there are the more conventional theories about the relationship of IT to business such as the strategic alignment model (Henderson & Venkatraman 1993).

These areas of extant research all provide pieces of the overall jigsaw, but what is required is a consistent, well founded *framework* that will allow reasoning about where and why rigidity exists in the organisation's ability to effectively deploy IT to meet change business needs. Implicitly, such a framework should provide a way of capturing the essential elements and structure of the problem domain, and enable reasoning about the domain.

"Framework" is possibly a somewhat overused term. There are many examples of so-called frameworks in the IS and business literature, for example, the Zachman framework (Zachman 1987); TOGAF (The Open Group 2009); the Strategic Alignment Model (SAM) (Henderson, Venkatraman & Oldach 1996); the framework for enterprise interoperability (Chen & Daclin 2006) to name just a few. Whereas the subject matter varies, the idea of the "framework" as a way of unifying and structuring what is known in a field of discourse as a means of communication, seems to be common. As has been noted (Palvia & Mao 2003) frameworks have tended to be the object of research endeavours where it has been difficult to formulate theory. However a framework may also be considered a theoretical artefact (Gregor 2006). In this thesis, the Framework¹, the designed artefact that is the output of the research, is consistent with this view. It provides a way of viewing of the world and moreover a way of explaining phenomena.

Current approaches are limited in their support for reasoning about the business-IT relationship. While certain empirical relationships between business and IT concepts (depending on the chosen

¹ Which will be denoted by capitalisation throughout this thesis

ontology) have been identified in the literature (e.g. Reich & Benbasat 2000; Wang et al. 2012; Chan, Sabherwal & Thatcher 2006), the models developed have tended to be coarse grained – often at the firm level – and have been short on mechanism. There is a lack of finer grained models which would explain mechanisms of business – IT alignment in more detail and thereby assist in identifying where the rigidities lie. Thus, the core objective for the Framework is to provide this finer grained view in terms of a set of constructs that elucidates a dynamic behavioural as well as structural aspect of these business and technology relationships within the overall organizational context.

1.2 Alignment and Agility

There is a significant quantity of research that substantiates the idea that IT produces value for the organisation (Melville, Kraemer & Tanniru 2004; Avison et al. 2004; Wang et al. 2012), and that, in particular, the strategic alignment of IT produces business value (Oh & Pinsonneault 2007; Tallon 2007). However, there is a paradox associated with alignment, that alignment can be detrimental to the very flexibility the organisation is seeking to achieve (Tallon 2003). The nature of the organisational environment, particularly its dynamics (including concepts such as uncertainty, heterogeneity and rate of change) have thus called into question the validity of the idea of alignment and whether it is still a worthwhile objective for firms to pursue (Smaczny 2001; Grant 2010).

In parallel to the traditional IS “alignment” perspective, research in other disciplines has also looked at the organisation and the role of technology. In fact, one could infer that the prominence of technology in the modern world and particularly as an enabler of business has seen a convergence of research agendas across disciplines such as information systems, management science and organisational science as the lines between the organisation, the business environment and the technology become more complex to delineate. Of course, each research discipline brings with it a body of extant research and perspectives it can offer into these issues. Of particular interest and relevance to this research project is how these other disciplines have characterised “agility” and looked at the dynamic aspects of organisations, through theories such as dynamic capabilities (Teece & Pisano 1994; Teece et al. 1997), organisational routines (Feldman & Pentland 2003; Pentland & Feldman 2005; Pentland et al. 2012) and complex adaptive systems (Gell-Mann 1994; Kauffman 1995). Cross-pollination of these ideas into the mainstream business-IT alignment literature has been mixed. The field has shown some shift away from the predominantly static models of alignment that developed early on (e.g. Ein-Dor & Segev 1982; Henderson & Venkatraman 1993).

One promising example of this is where complex adaptive systems theory has been applied to co-evolutionary theories of business and IT (Peppard & Breu 2003; Benbya & McKelvey 2006).

Organisations are complex social entities as well as technological ones (Morgan 1997), however, concepts such as “business process” are largely still regarded as deterministic executable entities (e.g. Weske 2012) that make little allowance for the non-determinism of human action. The research advanced in this thesis is based on organisational building blocks that comprise *both* human and technological aspects, and the proposition that these give rise to agility as an emergent property at the organisational level.

A central tenet of this thesis is that there is more to be gained from adopting a cross-disciplinary approach to this problem space. The proviso is of course that any cross-disciplinary concepts are ontologically well-founded and methodologically sound in the context in which they are used.

1.3 Research Question

“What is the novel framework that enables understanding of the role played by business-IT alignment in overall organisational agility”

To address this overall question, the research will tackle these sub-questions:

- What are the consistent ontology-based constructs that allows the representation of the elements of the business – IT landscape within the organisation?
- How can we characterise the components of the business and IT relationship at a fine-grained level, and hence what alignment between them means?
- What generalisations or heuristics can be identified that will assist in identifying and locating the source of inflexibility in the business – IT landscape that are the roadblocks to organisational agility?

1.4 Motivation for the Research

To summarise, the motivations for this research project are:

- Firstly, that it is a topical and important problem. In increasingly turbulent and volatile business environments, more than ever before, modern organisations must adapt their business to change when at the same time their business-IT landscape becomes ever more complex and interdependent.

- Secondly, there is ambiguity in the existing literature. There are a variety of existing theories about organisational agility and IT's role as an enabler or inhibitor, pointing to the need for a greater depth of understanding about the business-IT nexus.
- Thirdly, there is a lack of insight into the mechanisms within the organisation that give rise to agility. Current theories are predominantly at the organisational level and lack the granularity to enable reasoning about where and why rigidities are present and their implications for organisational agility.
- The fourth motivation relates to the relative silence in the extant research on the microfoundations of organisational agility itself, as an important adjunct to the work in dynamic capabilities (Teece et al. 1997) and ambidexterity (O'Reilly & Tushman 2011) research. Of the latter, as argued by Wilden et al. (2016), there are still gaps and issues associated with current microfoundational research.
- Finally, the socio-technical dimension of the business-IT relationship (Orlikowski & Baroudi 1991; Orlikowski & Scott 2008) has largely been overlooked by IS scholars. Adopting a cross-disciplinary approach creates the opportunity to leverage mature theories of the organisation that provide a stronger human-behavioural orientation to shed light on the role of the human agent as a determinant of organisational flexibility.

1.5 Significance of the Research

The research presented here makes contributions to both theory and practice in the field of Information Systems.

Contributions to theory

The Framework that has been developed in this research project represents a novel theoretical IS artefact. The contribution is a theory of organizational agility that extends the body of knowledge in two respects. Firstly, it provides a new multi-level microfoundational model in terms of granular, socio-technical building blocks which specifically recognises the human behavioural role in the macro-level phenomenon of agility. Secondly, by elucidating microfoundational mechanisms, the theory defines a stronger causality model (Mingers 2004; Tsang 2014) for the explanation of organizational agility phenomena when compared to the traditional statistical models that are prevalent in quantitative management science research. The Framework is positioned as a “theory for explaining” (Gregor 2006).

The research has applied existing knowledge in new ways. By using an inter-disciplinary approach drawing on several theoretical bases including dynamic capabilities (Teece & Pisano 1994),

organisational routines (Feldman & Pentland 2003), technology affordances (Leonardi 2011; Majchrzak & Markus 2012; Zammuto et al. 2007) and systems dynamics (Senge 1990) to formulate a coherent, granular view of the business –IT landscape within the organisation.

Contribution to Practice

The Framework contributes to management practice by framing the “organisational agility problem” in terms of lower level, but familiar, management concepts such as organisational capabilities, business processes and the role of IT at the process level. The insight offered by the research is that the usual management “levers” that relate to these different organisational components can cause unintended effects. By characterising the organisation as an ecosystem of adaptive and interdependent components, a stimulus (e.g. management intervention) in one area can cause a compensating effect somewhere else. Recognising the existence of these mechanisms has been a key focus of the research.

1.6 Organisation of the Thesis

Chapter 2 presents a comprehensive review of the relevant background literature.

Chapter 3 describes the research methods and discusses the justification for the approach taken. The research follows an interpretive approach to build “a theory for explaining and predicting” (Gregor 2006). Following Eisenhardt (1989; Eisenhardt & Graebner 2007), the theoretical artefact is built and validated using case studies. The case studies follow an interpretive, qualitative approach guided by Yin (2009) and Miles et al. (2013). The research is underpinned by kernel theories drawn from management and organisational science.

Chapter 4 presents the initial theoretical development of the Framework, prior to its further elaboration and validation through the empirical part of the research. A conceptual model designed to understand organisations in terms of granular building blocks is derived, and its grounding in extant theories of organisational routines (Feldman & Pentland 2003; Pentland & Feldman 2005), organisational capabilities (Helfat 2000; Helfat & Winter 2011), dynamic capabilities (Teece & Pisano 1994; Teece 2007) and technology affordances (Zammuto et al. 2007; Leonardi 2011) is discussed.

Chapters 5-7 present three qualitative case studies, each based on a different organisation that exists in a turbulent, competitive commercial environment and that is also a significant user of IT to enable its business. For each case study, the specific organisational context and its suitability for inclusion in the research is discussed. Consistent with the build and evaluate research methodology (Eisenhardt 1989; Eisenhardt & Graebner 2007; Yin 2009; Miles et al. 2013), for each case, the

emergent empirical themes are discussed in the context of the developing theoretical framework. The case study organisations comprise a large multinational provider of IT services, a research-based pharmaceutical company and a major Australian retail company.

Chapter 8 reviews the publications that have arisen from this research project. This chapter places the publication chronology in the context of the other strands of the project. Exposure to review and critique at conferences and in peer-reviewed publications and during the development of the concepts and ideas has been an important adjunct to the empirical part of this research.

Chapter 9 brings the theoretical and empirical parts of the research project together in a discussion that addresses:

- How the designed and developed Framework addresses the research objectives and what insights it offers on the role of business-IT alignment and organisational agility.
- The validity of the Framework as a theoretical artefact.

Chapter 10 concludes the main body of the thesis, noting the limitations of the work and suggesting avenues for further research.

2 Literature Review

2.1 Introduction

This chapter presents a review of the relevant background literature in three parts.

- Firstly, an assessment of the treatment of underlying concepts in the relevant extant research, together with a critical examination of the ontological foundations.
- Secondly, the extant research that examines the relationship of IT to organizational agility is reviewed, to provide a baseline for the proposed research.
- Finally, the leading theoretical models for IT alignment are examined from the point of view of how they express the business – IT relationship and incorporate the dynamic element.

2.2 Organisational Building Blocks

Organisations, as the subject matter of research, have been approached from a number of perspectives ranging across organisation science, management science and information systems (IS) disciplines. Over time and with the advance of technology, it could be said the research agendas across these disciplines have been brought closer together as understanding the role of technology in the modern organisation assumes a greater importance and focus. Each discipline, however, brings with it its own philosophical position, ontologies and epistemologies, which have given rise to a wide variety of conceptualisations of the organisation and of organisational building blocks, such as “business process”. Notwithstanding this there are benefits to taking a cross-disciplinary approach to synthesising new and useful conceptualisations.

This research project set out to build a well-formed artefact – one that is self-consistent and that allows coherent causal reasoning. The bedrock of such an artefact is a sound scientifically based ontology. The starting place is therefore a review of some of the ontological foundations of the existing relevant theories.

The problem domain represented by the research project is remarkable, not least because of the plurality of theories that have been developed across the intersecting disciplines involved. Some of the relevant theories arising out of the organisational sciences have been: dynamic capabilities (Teece & Pisano 1994; 1997), organisational capabilities (Dosi, Nelson & Winter 2000), organisational routines (Nelson & Winter 1982), the resourced based view of the firm (Wernerfelt 1984; Barney 1991), core competencies (Prahalad & Hamal 1990), value chains (Porter 1985) and practice theory (Feldman & Orlikowski 2011). In the socio-technical space, we have actor-network theory (Latour

1987), the viable systems model (Beer 1979), work systems (Alter 2013), technology affordances (Zammuto et al. 2007) and imbrications (Leonardi 2011). In the information systems realm, we have the strategic alignment model (Henderson & Venkatraman 1993; 1996) and associated satellite theories.

These theories invoke various “units of analysis” as a means of decomposing the organisation and understanding the concepts relevant to the specific objectives of the researchers. Over time some “generally understood” common definitions have emerged that have allowed strands of research to cross-fertilise and propagate. Similarly, however, inconsistency and confusion have also arisen in some of the concepts and terminology. In developing a framework to reason about the relationship of business and IT in the modern organisation, the research project set out to build a robust ontology of the key organisational concepts as a foundation.

The following discussion looks at some of the ontological issues that have emerged in the literature.

2.2.1 Resources

The concept of a “resource” is a foundational abstraction for describing an organisation. It has been taken to mean virtually anything that can be used to create value for the organisation. Wernerfelt (1984), who was largely behind the theoretical underpinning of the resource based view of the firm (RBV), thought of resources as any assets that could be tied to the firm (at least in a semipermanent way) and that these form the firms strengths and weaknesses. More precisely, firm resources were taken to include all assets, capabilities, organisational processes and firm attributes etc. that the firm deploys to create value (Barney 1991). The RBV holds that a firm’s competitive advantage is conferred by resources that are valuable, rare, imperfectly imitable and non-substitutable (VRIN) (Barney 1991). The RBV has had considerable influence on the organisational and management sciences, and underpins other theories such as the dynamic capabilities (Teece & Pisano 1994; Teece et al. 1997; Teece 2007; Teece 2012) that regard resources essentially as assets that are orchestrated by higher order processes to produce the value for the firm. Dynamic capabilities themselves have been open to numerous interpretations, discussed separately below. Researchers have developed the RBV further to include IT assets and competencies as further types of firm resource (Aral & Weill 2007).

The RBV’s relatively static view of resources is challenged by Feldman and Orlikowski, who inject the human agency perspective of “resource-in-use”: “it is unsettling to take on the notion that a resource is defined not by what it is but by the practices through which it is enacted as a resource”

(2011, p.17). This perspective represents the influence of structuration theory (Giddens 1984), where the “agency” whether human or non-human and the underlying structure (or abstraction) of the resource are regarded as existing in a duality such that one cannot be considered without the other.

The dichotomy formed by this view and the more traditional “objectivist” view, which holds that discrete components such as resources can be analysed independently of context, runs through the literature in the organisational and management sciences, and features again in subsequent discussion.

2.2.2 Organisational Routines

The idea of a “routine” as the repeatable patterns of activity representing how the work of the organisation is done, is fundamental to understanding this problem domain as it goes to how IT, as a type of resource, is *used* in the business context – presumably to create value for the organisation. However, as pointed out in Becker’s review (2004), there have been several ontological difficulties with the term as used in the research literature. Two areas emerge in particular: i) how routines apparently evolve over time to adjust to change; and, ii) the socio-technical perspective that incorporates agency as a fundamental part of the routine.

Evolution of Routines

The organisational routine was placed in the context of evolutionary economics by Nelson and Winter (1982). Subsequently, this evolutionary perspective on routines has been developed by several authors seeking to understand how organisations apparently adapt their ways of doing business and creating value in the context of changing environments (e.g. Feldman & Pentland 2003; Pentland et al. 2012; Volberda & Lewin 2003; Pentland & Feldman 2005). The ontological basis for applying evolutionary theory to routines has however been questioned: Hodgson (2003), in particular, explores whether evolution is just being used as an analogy, or else explains more directly (i.e. ontologically) the underlying mechanisms in a genetic sense. If the latter, he raises the question of just what the genetic components are and what the mechanism of replication is: whether a routine is actual exhibited behaviour (“phenotype” in evolutionary parlance) or potential behaviour (or “genotype”). For their part, Pentland and Feldman (2012) use a simple representation of a routine as a sequence of actions in their evolutionary simulation model.

In their characterisation of the co-evolution between firms, Volberda and Lewin (2003) place routines at the bottom of a three tier hierarchy with “capabilities” and “competencies” . While the

ontology of the routine itself is not discussed (they assume a viewpoint that aligns with the RBV), the characteristics of different evolutionary models are examined. They distinguish between naive and *intentional* variation and selection processes, thus implicating the role of managerial action in shaping the evolution of firm competencies.

The Role of Agency

The specificity of the routine to its context, as noted by Becker (2004), influences its ability to be replicated and the inertia it generates within the organisation. The influence of structuration theory is evident in how Pentland and Feldman (2003) conceptualise routines. They distinguish the duality of “ostensive” and “performative” facets – the former representing the idealised, codified representation of the routine and the latter the routine-in-use, or what actually happens in practice. The implication here is that the routine may be performed differently each time it is repeated even if the ostensive aspect remains the same.

Leonardi (2011) pursues the flexibility of routines in terms of the interplay between human and material agency. This views the human agent (e.g. a technology user) and material agent (e.g. a technology artefact) as equal partners in a synergistic relationship. The metaphor of imbrication – or interdependent pattern, analogous to roof tiles – places the human-material agency as the building block of organisational routines. He posits that it is the imbrication of both agencies is the determinant of overall routine flexibility. The challenge with this view is how this performative aspect of routines is reconciled with the ostensive one – that there is something that still identifies what the routine’s goal is that transcends all of the tactical changes that can occur as it is performed.

Ontologically, the imbrication theory of the routine creates a point of departure from the earlier theories driven by the RBV. The “routine” and “what is operated on by the routine” become indistinguishable as they are conceptualised as a set of imbrications where neither the human or material agency is predominant. Similarly in sociomateriality (Orlikowski & Scott 2008; Cecez-Kecmanovic et al. 2014) and actor network theory (Latour 1987), neither the material nor the human agency is privileged over the other. This creates difficulties with respect to understanding the concept of the intentionality of the actors, since we are not used to thinking of material agencies as having *intention* (Pentland 2013).

Again deriving from actor network theory, technology affordances (Zammuto et al. 2007; Majchrzak & Markus 2012) are conceptualised as a relational construct between the user and technology artefact. Technology affordances refer to the potentiality of use of the artefact as perceived by the

user. Whereas this concept is the foundation for Leonardi's imbrications, it does not impose the strict symmetry of the human and technological agencies.

Alter (2013) defines a related concept: a "work system" as a unit of analysis of organisations: "A work system is a system in which human participants and/or machines perform work (processes and activities) using information, technology, and other resources to produce specific products/services for specific internal and/or external customers" (2013, p.75). Work systems theory (WST) sets out to treat the social and technical components of the system as symmetrical agencies and thereby has some commonality with performative routines, technology affordance and imbrications previously discussed. Work system is a higher-level concept however that can potentially reach outside the organisation to suppliers, partners and customers.

In summary, and notwithstanding the ontological issues, in the context of the research project the preceding discussion represents important input from the outside the traditional Information Systems domain. The socio-technical theories add a dimension that has been missing from the traditional artefact-driven IS orthodoxy such as business process management (Weske 2012) or enterprise architecture (e.g. The Open Group 2009).

2.2.3 Capabilities

Dosi et al. make the observation: "The term 'capabilities' floats in the literature like an iceberg in a foggy Arctic sea, one iceberg among many, not easily recognized as different from several icebergs nearby" (2000, p.3). Along with the "routine", the word "capability" represents a term that is used in a specific technical sense as well as in its common plain English sense, often interchangeably. It is therefore a source of ambiguity and lack of precision in the literature. Tell (2014) attempts a disambiguation based on what a capability is *not*. He argues that a capability "is a substantial possibility that source entities lead to a result" (2014, p.139), where the "entities" referred to are the people, materials or processes that the capability derives from.

In the context of the research project, there are two specific terms or types of capability that are of interest: *organisational* (sometime called operational, or ordinary) capabilities and *dynamic* capabilities.

Organisational Capabilities

Winter defines an organizational capability as "a high-level routine (or collection of routines) that together with its implementing input flows, confers upon an organization's management a set of decision options for producing significant outputs of a particular type" (2003, p.991). This definition

highlights the first ambiguity: is a capability the same thing as a routine? Dosi et al. (2000) distinguish the two on the basis of recognisable purpose. In their scheme, routines are repeatable units of activities, but a capability has a purpose or outcome that it is supposed to enable. Routines are thus the building blocks of capabilities, but would only satisfy the definition of being a capability themselves if the recognisable purpose is evident. Schreyogg et al. (2007), in their definitional analysis, identify several higher order characteristics of organisational capabilities, such as representing collective organisational problem solving, combining explicit and tacit knowledge and being repeatable, reliable pattern of action. That these capabilities represent the product of organisational learning, and are what generates the value for the firm seem to be common across these viewpoints.

Dynamic Capabilities

The identification and characterisation of dynamic capabilities (DC) goes back to the mid-nineties (Teece & Pisano 1994; Teece et al. 1997) and the concept has been continually refined since then by scholars working in the organisation and management sciences. The initial definition of a DC was as the “firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments” (Teece et al. 1997 p 516). The theory was a response to the intrinsically static nature of the RBV and is further discussed later in the context of organisational dynamics.

From a definitional point of view, difficulties have been identified by several authors. (Barreto 2009; Wang & Ahmed 2007; Ambrosini & Bowman 2009). The first question is why draw the distinction between organisational capabilities and DCs. The latter is an instance of the former by definition; however, the literature contains different perspectives on the distinction. Helfat and Winter (2011) acknowledge the demarcation is blurred. Their distinction rests on operational (i.e. organisational) capabilities (OC) being associated with maintaining the status quo using the current methods and techniques; whereas the DCs being about changing the way things are done. This places them at a meta-level, where DCs can modify OCs. This is consistent with Winter's (2003) hierarchy of capability types. Teece (2012) places a clearer ontological distinction between the two by likening OCs to routines, whereas the DCs have strategic intent and therefore the role of top management is implicated in how they work. Eisenhardt and Martin's (2000) conceptualisation views DCs strictly as processes operating on firm resources to create new configurations. Their definition also allows the DC to affect the market as well as respond to it. These authors took the step of excluding the firm performance from the definition to avoid the difficulty of empirically testing whether value is coming from the firm's unique resources themselves or the processes operating on the resources. By

distinguishing DCs from being just another type of firm resource, there is then no reason why they should be unique or inimitable per the RBV. They admit the possibility of the same DCs being used in different firms, as in for example, “best practice”. This marks a point of departure from the “Teecean” view, which follows the precepts of the RBV in terms of the uniqueness of the DC. The view that this definitional dichotomy had remained unresolved in the subsequent literature, was the subject of a paper by Peteraf et al. (2013). These authors argue that there has been a lack of scholarly debate across the two “camps” that explains why such a fundamental issue has persisted. Teece (2014) revisits the DC framework, its intended purpose and conceptualisations, with the objective of addressing these foundational concerns.

Other definitional viewpoints have been put forward by scholars. In response to the perceived lack of definitional clarity, Barreto (2009), contributes this: “A dynamic capability is the firm’s potential to systematically solve problems, formed by its propensity to sense opportunities and threats, to make timely and market-oriented decisions, and to change its resource base” (2009, p.271). This goes a long way to unifying the key contributions from the earlier work, at the expense of increased complexity in the definition itself. Mulders and Romme emphasise the repeatability characteristic of DCs and the fact that they are a high order knowledge-based process that “question purpose and effectiveness of the resource base” (2009, p.67).

At the other end of the definitional spectrum, we have the view of DCs as a “capacity” rather than a process, with the intentionality this implies. As noted by David Teece: “Enterprise-level dynamic capabilities... consist of more than an aggregation of routines. Routines identify how projects are run, but not necessarily how projects are identified, prioritized, and selected” (2012, p.1397).

In an influential work by Teece, the components of DCs are characterised as *sensing* and *seizing* an exogenous opportunity and then *reconfiguring* the firm’s resource base accordingly for competitive advantage (Teece 2007). Building on this, Helfat and Peteraf (2015) take their microfoundational lens to the level of the individual, in particular executive management. Here the concept of the “managerial cognitive capability” is proposed as contributing to, or underpinning, Teece’s three DC components.

Competencies

Like capability, the term “competency” (or “competence”) has been used in a variety of ways both in specific technical and in more general senses. Teece and Pisano (1997) use the term in their original definition of dynamic capabilities as referring to what the latter are operating on. This usage equates them to a type of resource. Core competency theory, on the other hand places them at a higher

level of abstraction, being those valuable *capabilities* that specifically deliver customer benefit (Hafeez & Malak 2002). Consistent with this view is Volberda and Lewin (2003), who place them at the top of a discrete three level hierarchy (with capabilities and routines occupying the other two levels) in their multi-level view of firm co-evolution. This view suggests that competencies are the “externally facing” view of the firm’s capabilities – the ones that are important from a competitive marketplace point of view, whereas the other two are endogenous to the firm. McKelvey (1999) uses the term collectively to include resources, capabilities and activities (per Porter’s value chain (1985)). This conceptualisation greatly simplifies his task of creating an evolutionary simulation model. Despite this simplification, the usage of the term essentially aligns with the core competency theorists since co-evolution at the firm level is being modelled, with competency being the essential genetic component that is being selected for.

IT Capabilities

Finally, the term “IT capability” is also used frequently in this research domain. Aral and Weill place IT capabilities within the realm of organisational capabilities, by defining them as “interlocking systems of practices and competencies that complement IT” (2007, p.765). Others place them at a higher level of abstraction, for example “a firm’s ability to acquire, deploy, combine, and reconfigure IT resources in support and enhancement of business strategies and work processes” (Lu & Ramamurthy 2011, p.932).

Relevance of the Capability Concept

For this research project, the concept of “capability” (including both organisational and dynamic aspects) is important as it provides a unit of analysis that can span the exogenous and endogenous perspectives of the organisation. From the endogenous viewpoint, it provides a granular way of encapsulating what the organisation *does* to make a living (Helfat et al. 2007) and allows the dependencies on lower order building blocks such as routines and other resources to be integrated into the picture. From the exogenous perspective, it provides a way of understanding the market forces to which the organisation must respond (or influence) in terms of which capabilities that offer competitive advantage and how these must change over time as the environment changes. The endogenous and exogenous perspectives are captured in the concepts of technical and evolutionary fitness (Helfat et al. 2007) respectively. Here evolutionary fitness relates to how well an organisation can extend its resource base in response to environmental demands and continue to earn its living, whereas technical fitness relates to the efficiency of the capability in performing its current function. That technical fitness is a component of evolutionary fitness implies the connection between

endogenous and exogenous perspectives. This point will be returned to in the context of describing organisational agility.

2.2.4 Business Processes

There is a disciplinary bias evident in the use of the term “business process”. The information systems community has a preference for the term when talking about the sequence of actions or activities performed by organisations to accomplish work. On the face of it they could easily be talking about “routines” as used in management science. The term is used with an implicit meaning by a range of IS authors (e.g. Tallon 2007; Luftman 1996; Sambamurthy et al. 2003; Henderson et al. 1996; Vidgen & Wang 2006 to name a few) and one could say it is firmly entrenched in the IS world view. Foundations for an IS definition of the term can be found in Hammer and Champy (1993). Weske’s definition follows this lineage and is typical of the IS perspective “A business process consists of a set of activities that are performed in coordination in an organizational and technical environment. These activities jointly realize a business goal. Each business process is enacted by a single organization, but it may interact with business processes performed by other organizations.” (2012, p.6). This is notable in that it aligns more closely with capability as defined by Dosi et al. (2000), as it includes the concept of purpose. As discussed previously, routine is used in a more nuanced way. The concept is firmly intertwined with the idea of agency. The IS-centric notion of the “executability” of a business process is foreign to the organisational routine concept.

2.2.5 Services

Of all the concepts discussed so far, “service” has probably the widest range of usage both across the management and information sciences. There are two aspects to its inclusion in this list of foundational concepts. Firstly, the concept as used in the service sciences (e.g. Vargo & Lusch 2004) is related to the other organisational concepts discussed previously, and needs to be disambiguated. Secondly, it features in the information systems realm, where it independently has been used in multiple settings with multiple interpretations. In the context of the research project, it is a candidate unit of analysis that, together with the other concepts, will allow the essential business-IT relationship to be examined and modelled at a granular level.

Representative of the view taken in the service sciences, Vargo and Lusch define services as “the application of specialized competences (knowledge and skills) through deeds, processes, and performances for the benefit of another entity or the entity itself” (2004, p.2). Central to this view is the idea of a service as a process whereby the providing entity and the consuming entity co-create value (Normann & Ramirez 1993). The relationship here to the competencies discussed previously is

clear. In this context, a service can be thought of as a mechanism whereby competencies (i.e. capabilities) are orchestrated and leveraged to create value in the marketplace. Service architectures (e.g. Voss & Hsuan 2009) can provide hierarchical decompositions of service systems to fine grain service components.

In the information systems (IS) domain, on the other hand, the term “service” is used somewhat differently. The Service Oriented Architecture (SOA) paradigm regards it as a low level technological concept. A typical SOA definition is given by Brown et al (2005, p.728): “a coarse-grained, discoverable software entity that exists as a single instance and interacts with applications and other services through a loosely coupled (often asynchronous), message-based communication model.” Note that this says nothing about purpose or function. Vidgen and Wang (2006) align to this definition in their simulation of a business process management (BPM) ecosystem consisting of processes and IS services.

Still within the IS domain, but at the other end of the spectrum, the Open Group points to a higher-level concept of “business service”. “Business-led SOA considers a business service to be a unit of business capability supported by a combination of people, process, and technology. A business service may be: fulfilled by manual processes, or may be fully automated; fulfilled within an organization, or outsourced to a partner; exposed to any combination of employees, customers, partners, and suppliers; fulfilled at the point of use, at a divisional level, or as a corporate competency center” (The Open Group 2009, p.251). This definition has more in common with Voss and Hsuan’s (2009) “service component” or indeed “capability” as previously discussed.

2.2.6 Summary

The preceding discussion has highlighted some important concepts as well as some ontological issues in this research domain:

- The key organisational concepts of capability, routine, process and service are relevant to the research project in that they cover the scope of what the organisation does and how it achieves it, they allow for both endogenous and exogenous viewpoints, and they allow a granular view of IT to be placed in the overall business context;
- There is no single consistent ontology to underpin these concepts.
- The terms are used in a general as well as a specific technical sense. This is misleading as the plain English meaning of these terms can confuse and cloud the understanding of the subject matter.

- The cross-disciplinary nature of the field adds to the definitional problems. Each discipline tends to create its own set of jargon. Confusion arises where the jargon overlaps across disciplines.

2.3 IT and Organisational Agility

This section looks at the existing research that has examined the relationship of IT to the agility of the organisation in the context of the dynamic business environment. This forms an important baseline for the proposed research.

2.3.1 Organisational Agility

Agility is an organisation's ability to identify, seize and exploit opportunities more quickly than its competitors (Sambamurthy et al. 2003; Overby, Bharadwaj & Sambamurthy 2006; Sull 2009; Lu & Ramamurthy 2011). Under this rubric, several types of agility have been characterised. Broadly speaking these fall into two areas. On the one hand, there is the perspective that is endogenous to the organisation. One example of this is “operational” agility (Sambamurthy et al. 2003; Sull 2009), which is founded on organisation’s ability to improve or find greater efficiencies *within* a given business model, as represented by its set of business processes. Related to this is the concept of “operational adjustment” agility (Lu & Ramamurthy 2011) in which it is the organisation’s existing business processes’ ability to respond quickly to outside changes that confers the overall agility to the organisation. Another example is “IT-dependent organisational” agility (Fink & Neumann 2007), where the capabilities of the internal IT organisation (e.g. the ability to understand and engage with the business) are the antecedents of the organisational-level agility outcome.

On the other hand, there are the exogenous perspectives such as “portfolio” agility (Sull 2009), “customer” agility or (Roberts & Grover 2012) “market capitalising” agility (Lu & Ramamurthy 2011) which relate to whether the organisation is sufficiently attuned to the external market’s needs and can quickly adapt and deploy the right mix of products and services to take advantages of market opportunities. These two perspectives can be summarised in terms of a scenario where, in responding rapidly to an opportunity (i.e. demonstrate agility), the internal agility perspective relates to how well the “machinery” of the organisation works to allow this response to happen. In contrast, the external perspective relates to whether this machinery is providing the “right” response at the right time.

This dichotomy goes to the heart of the question of how OA should be conceptualised. In the dynamic capabilities literature, the endogenous and exogenous organisational perspectives

represent a recurrent theme in the characterisation of concepts such as organisational adaptation, flexibility and ambidexterity. Table 1 lists some of the perspectives offered by this research on the conceptualisation of OA.

Table 1 - Perspectives on Organisational Agility

External Perspective	Internal Perspective	Conceptualisation organisational agility	References
Flexibility	Efficiency	Leadership in the organisation must resolve the tension between efficiency and flexibility. Organisations tend to become more structured as they age and grow, which emphasises efficiency, but places them at a disadvantage in dynamic environments. The task for management is to optimise structure depending on the types of environmental dynamics. There is an important cognitive dimension to how managers deal with the efficiency-flexibility tension.	(Eisenhardt, Furr & Bingham 2010)
Sense	Respond	As firm's sensing and responding capabilities need to be in synch. The overall agility of the enterprise can be measured in terms of the alignment of the sensing and responding capabilities.	(Overby et al. 2006)
Adaptability	Alignment	Dynamic organisational environments require contextual ambidexterity: the simultaneous capability to demonstrate alignment and adaptation across business unit (s). This requires individual-level judgement on how to resolve the competing demands of alignment and adaptability.	(Gibson & Birkinshaw 2004)
Adaptability	Absorption	Absorption refers to the ability for organisations to "ride out the storm" and bide their time until the right opportunity is presented and can be seized. This may equate to having greater endurance (than a competitor) through a more diversified portfolio of resource assets, for example. Thus, when faced with a turbulent environment that poses a threat to survival, absorption and agility are two different approaches an organisation could pursue	(Sull 2009)
Innovation	Efficiency	Over focus on efficiency can lead to inertia where the desire to achieve best practice distracts management from bringing about change. Innovation requires dynamic capabilities to identify latent need, technology opportunities and then orchestrate resources to achieve them.	(Teece 2014) (Benner & Tushman 2003; Benner & Tushman 2015)
Innovation	Variety	Resilience, the capacity of the organization to continuously innovate to renew itself, requires the organisation to pre-empt the shifts in the market place and innovate new capabilities as business-as-usual. To do this they need to generate and maintain the internal <i>variety</i> that all adaptive systems need to apply in order to adequately respond to their environments. Examples being incubators, skunkworks and strategic experimentation.	(Hamel & Valikangas 2003; Gilly, Kechidi & Talbot 2014)
Exploration	Exploitation	Long term firm survival required <i>both</i> exploitation (of current assets) and exploration (searching for new innovations). However, these give rise to contradictory demands that must be traded off with each other. The leadership challenge is to orchestrate resources between the old and the new business domains.	(Benner & Tushman 2003; O'Reilly & Tushman 2013; Benner & Tushman 2015)
Dynamic capabilities	Ordinary capabilities	Dynamic capabilities are needed to manage and orchestrate the firm's resources in continually shifting business environments so the right things are done at the right time.	(Teece 2014)

External Perspective	Internal Perspective	Conceptualisation organisational agility	References
Evolutionary fitness	Technical fitness	Evolutionary fitness measures how well an organisation can purposefully create or extend its resource base and hence the way it earns its living. Technical fitness is simply how well a capability performs its current function. Evolutionary and technical fitness are conceptualised as being inter-dependent, implying a tension between short-term (technical fitness) and long-term (evolutionary fitness) goals.	(Helfat et al. 2007; Teece 2014)

Other terms such as *resilience* and *absorption* are mentioned in the literature in the context of agility. Organisational resilience has been defined as the capacity of the organization to continuously innovate to renew itself (Hamel & Valikangas 2003; Gilly et al. 2014). This idea represents a paradigm shift over the traditional management orthodoxies that have pursued efficiency and optimisation as overriding objectives. The inference here is that the turbulence and volatility of the modern organisational environment has rendered these latter strategies to be insufficient, notwithstanding their huge success, dating back to the industrial revolution. Instead, the resilience that organisations need to possess in this new world is bound up in how they are able to pre-empt the shifts in the market place and innovate new capabilities as business-as-usual. Continuing the evolutionary analogy, part of how they do this is through generating the *variety* (Ashby 1956) that all adaptive systems need to apply in order to adequately respond to their competitive environments (Levin 1998). Examples of these are innovation projects, incubators and skunkworks where small up front investments can test promising new directions as a win-fast/fail-fast tactic.

Whereas this characterisation of resilience emphasises the organisation's adaptability, other authors have introduced a more nuanced view of resilience that stems from analogies to natural ecosystems. In the Resilience Architecture Framework (Mamouni Limnios et al. 2014) organisations can enter into a state of rigidity caused by over exploitation of existing routines, structures and functions (which may have been successful in the past). In this situation, resilience is associated with being unable to change from an undesirable state.

The concept of absorption is closely related to resilience. For example, in a physical system, the ability to absorb a disturbance and return to equilibrium is characteristic of the overall resilience of the system (Mamouni Limnios et al. 2014). In an organisational context, absorption refers to the ability to "ride out the storm" and bide time until the right opportunity is presented and can be seized (Sull 2009). This may equate to having greater endurance (than a competitor) through a more diversified portfolio of resource assets, for example. Thus, when faced with a turbulent environment

that poses a threat to survival, absorption and agility are two different approaches an organisation could pursue.

2.3.2 Role of IT

There has been significant research into the relationship that IT has with enabling organisational agility. Sambamurthy et al. make a case for how IT is the “platform for agility” postulating a role for IT as a “digital options generator” (2003, p.238). These authors describe digital options as two types of IT capability: digitized process – being IT enabled integrated processes both within the organisation in the wider value network; and digitized knowledge – being access to the firm’s knowledge base and sharing and transfer across interconnected networks. They posit two types of relationships between these digital options and agility: Firstly, as an enabler of agility, facilitated by entrepreneurial alertness². An example of this is where operational agility is enhanced by IT enabled process and knowledge coordination across the entire value chain. Partnering agility would be enhanced by extended enterprise networks that engender inter-organisational trust. The second type of relationship is in a co-evolutionary context, where agility has a positive effect on the creation of new digital options: “Greater levels of agility and an understanding of its benefits could also trigger recognition of the need to expand process reach and richness or knowledge reach and richness” (Sambamurthy et al. 2003, p.255).

Arun and Tang (2010) explore how two IT capabilities: IT integration and IT reconfiguration relate to three process capabilities: process alignment, partnering and offering flexibility and how these in turn impact firm performance. They found that these structural IT capabilities can contribute to positive firm competitive performance in “turbulent” business environments.

Tallon and Pinsonneault (2011) examine competing perspectives in the literature concerning the effect IT alignment has on organisational agility. On the one hand, there is the view that *alignment facilitates agility*. The main argument supporting this point of view is that the shared understanding and shared knowledge between business managers and IT (afforded by alignment) means that the organisation can “react to change in a more informed, aggressive, directed, and agile manner” (p. 468). From a RBV perspective, another argument is that alignment promotes IT usage which in turn can generate new opportunities for using existing IT resources in new ways or combining IT and non-

² Entrepreneurial alertness is one of the dynamic capabilities defined by Sambamurthy et al. (2003) - it broadly aligns with Teece’s (2007) notion of Sensing.

IT resources in new and innovative ways. This is consistent with the concept of affordances advanced by Zammuto et al. (2007) and Yoo and Boland (2012).

The other perspective explored by Tallon and Pinsonneault (2011) is that *alignment impedes agility*. The main argument for this view is that the same shared understanding between business and IT that alignment affords, can also work to maintain the status quo: that what worked well in the past might continue to work and the IT or business might be reluctant to push back on their counterparts because of the culture of consensus that has developed. Also, from the resource point of view, it may be difficult and/or undesirable to change quickly given sunk costs represented by investment in technology and the skill base of staff. So “resources that were once key to supporting a core competence can, in a new market, become a core rigidity” (Tallon & Pinsonneault 2011, p.469). The results of these authors’ empirical research support the first proposition: that, overall, alignment enables agility, but they point to the need for a finer grained understanding of alignment (e.g. at the process level) given the effect the firm’s chosen business strategy has on the locus of alignment. Tallon’s (2007) work on alignment at the process level makes initial progress in this direction.

Lu and Ramamurthy (2011) explore similar apparently contradictory research on the effect of IT capability on firm agility, where the former has been implicated as both an enabler and impediment. Their empirical results show support for IT capability as an enabler of two types of agility – essentially an outward looking “market capitalisation agility” and inward looking “operational adjustment agility”. The former of these is concerned with the entrepreneurial mindset in responding to market based needs, whereas the latter is concerned how rapidly the operations of the firm can be adapted. These authors claim that the alternate view of IT as an inhibitor of agility can be explained by their results: that enhancing IT capability is the enabler, as opposed to just increasing spend on IT. In other words, it is the focus of the spending that matters. A research limitation noted is the socio-technical dimension of the relationship of IT capability to agility remains to be fully explored. In summarising the extant research into role of IS in agility, Salmela et al. (2015) echo this point and have called for more holistic theories of the role of IS in agility that take greater account of the role of the individual and the synergies that give rise to agility as an emergent phenomenon.

“Current research leaves room for empirical research that more directly focuses on the characteristics of individuals, organisational processes and structures that enable agility”. (2015, p.12)

This is directly relevant to the current research project, which sets out to bring these elements into focus and address this gap in the extant research.

2.3.3 Organisational Modularity

Modularity is a general systems concept that concerns the ability of system components to be separated and recombined (Schilling 2000), providing flexibility of the overall system to be able to respond and adapt to its environment. Modularity is therefore a relevant concept in the study of organisational agility. This idea has been applied to various types of system (including notably IT systems) as well as to the organisation itself, which can be viewed as a hierarchy of nested systems. Schilling (2000) applies modular systems theory to the organisation, her immediate objective being to examine issues around inter-firm product modularity. Characterising (and designing) product modularity can inform decision making on how such products may be outsourced, leading to organisational design implications (Campagnolo & Camuffo 2009).

Sahaym et al. (2007) look at the tensions that exist between the organisation adopting a loosely coupled form, affording maximum flexibility, with the need for tightly coupled hierarchical control. They characterise “loosely coupled forms” as the ability to use alliances and contingent workforces. In this context, they examine the role of IT in promoting and sustaining these structures. They argue that “input diversity provides pressure on firms to become modular, specialize in a core set of activities, and rely on loosely coupled organizational forms to create flexible configurations” (Sahaym et al. 2007, p.876). Their main finding is that IT investment positively contributes to loosely coupled forms when industry standards exist and rates of technological change are low. This is consistent with the idea that IT enables coordination with alliance partners across firm boundaries.

Modular organisation theory has wide ranging applicability. In the context of organisational dynamics, it provides another lens through which to view the necessary conditions for agility. Indeed, the notions of coupling, separability and component specificity can be applied to other organisational constructs such as capabilities, processes and resources, lending a potential for reasoning about the relationships between these components and how this affects agility as a whole.

2.3.4 Summary

This section has examined several strands of research that deal with the nature of organisational agility and the role of aligned IT. The following points have been highlighted:

- Research in general supports the idea that IT alignment is a positive antecedent for organisational agility, however there is a lack of empirical evidence as to how this varies by finer grained concepts such as industry type, organisation type, process type or IT system type.
- Understanding IT alignment's effect on agility at a fine-grained level is still a topic for future research, despite some early progress.
- Systems theoretic concepts such as complexity, modularity, separability and recombination contribute a valuable insight into how organisation's may be regarded as systems that co-evolve with their environments.

2.4 Business-IT Alignment

This section reviews the leading theories from the IT alignment literature. The purpose here is to review the strengths and weaknesses of each with the goal of informing a new Framework that will meet the objectives stated earlier.

2.4.1 Definitions of Alignment

The word "alignment" itself has been defined in several ways in the literature when related to business and IT. Reich and Benbasat define it as "The degree to which the IT mission, objectives, and plans support and are supported by the business mission, objectives and plans – alignment – is conceptualized as a state or an outcome" (2000, p.82). Other authors have included structural elements such as processes, systems and organisation, such as the strategic alignment model of Henderson et al. (1993; 1996). The earlier models have regarded "alignment" as an end state that is reached. More recently, authors have looked at alignment as a process, for example as in Benbya and McKelvey's definition: "IS alignment is a continuous coevolutionary process that reconciles top-down 'rational designs' and bottom-up 'emergent processes' of consciously and coherently interrelating all components of the Business/IS relationship at three levels of analysis (strategic, operational and individual) in order to contribute to an organization's performance over time" (2006, p.287). This definition is also notable because it places the emphasis on alignment being a dynamic adaptive relationship between business and IT.

2.4.2 Strategic Alignment Model

Landmark work by Henderson et al. (1993; 1996) formulated a comprehensive framework that caters for both strategic and structural alignment perspectives. Earlier work, for example, had considered these perspectives separately, for example Earl (1989) only addresses the strategic level

view, whereas Ein-Dor and Segev (1982) only address the structural level. The Strategic Alignment Model (SAM) is a coherent model that addresses both dimensions. In addition, the model contains a reasoning mechanism that caters for different organisational contexts, where the alignment perspective may change. For example, in a conventional top-down style of strategic planning, the business strategy drives the organisational design, and this in turn determines the IT needs. In a changing technology environment, however, the IT strategy may be the driver by identifying new opportunities for the business afforded by emerging IT capabilities (Luftman 1996).

Despite its undoubted influence, shortcomings with the SAM have been recognized, which have given rise to some extensions to the basic model. The first criticism is that the SAM represents an essentially static viewpoint: even though it does recognise alignment as being a set of management processes, the adaptive component is missing (Peppard & Breu 2003). The punctuated equilibrium model (Sabherwal, Hirschheim & Goles 2001) extends the SAM by recognising that different alignment perspectives are needed corresponding to periods of stable equilibrium with the environment and that these are “punctuated” by rapid changes to another alignment perspective when the environment demands it. In this manner, the organisation adapts via several change mechanisms: the authors characterise revolutionary, evolutionary or post-revolutionary types of change.

Maes’ (2000) unified framework extends the SAM by introducing additional layers in each dimension, splitting out information and information systems as additional functional layers between the business and IT, and separating infrastructure from operations in the vertical dimension. This is depicted in Figure 1 below. Splitting out these architectural domains allows a more granular reasoning about the factors affecting business-IT alignment. Avison et al. (2004) adopt this framework and use it to empirically test business strategy alignment at the IT project level, by mapping the projects to the framework and then applying the SAM alignment perspectives (Henderson et al. 1996; Luftman 1996).

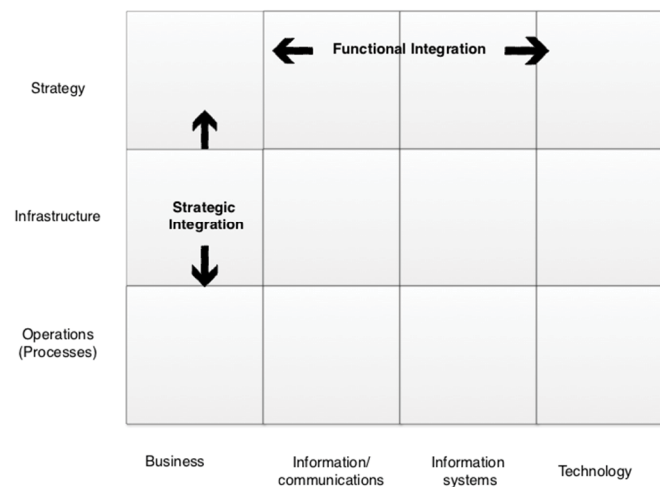


Figure 1 - Unified Alignment Framework (adapted from Avison et al. 2004)

In formulating the idea of strategic alignment maturity, Luftman (2000) focusses on the *process* of alignment rather than alignment as an end-state. This dynamic process dimension is incorporated into subsequent work that attempts to formulate a model of alignment as a dynamic capability comprising the three dimensions of strategic fit (as profile deviation), alignment process maturity and historical misalignment (Baker et al. 2011).

2.4.3 Enterprise Architecture

Enterprise architecture can be regarded as another extension to the SAM in terms of how it tackles IT alignment. There is a correspondence between the frameworks developed from the SAM by Avison (2004) and Maes (2000) and Enterprise Architecture (EA) frameworks (e.g. Zachman 1987; The Open Group 2009). Schekkerman's (2003) characterisation of EA shows the direct influence of the SAM, depicting alignment at the strategic and operational levels in the same manner.

Ross et al. (2006) use EA as a major strategic tool. They link organisational agility to having an executable (business) strategy. They define a foundation for this execution as "the IT infrastructure and digitized business processes automating a company's core capabilities." (2006, p.4). Articulation and implementation of the firm's operating model by means of EA is central to their approach. For them business-IT alignment is a pre-requisite manifested in the automation of business processes.

Another strength of enterprise architecture is in its representation of organisational building blocks such as technology components, business processes and organisational structures. EA frameworks arrange these building blocks into layered models such that the complexity of the organisation can

be “abstracted away” in terms of aggregate concepts (Winter & Fischer 2006). Thus, the concept of an “organisational capability” as an aggregate construct as part of a business architecture, for example, would provide a suitable abstraction for undertaking strategic planning.

2.4.4 Contingency Based Models

Contingency theory is prominent branch of management science that regards the performance of the firm as dependent on its specific operating conditions and environment (Child 1975), rather than on the unique set of resources the firm is able to deploy, as with the resource based view. In general terms, models built using a contingency-based approach identify variables of interest, such as a predictor variable (e.g. “strategy”) and a dependent variable (e.g. “performance”) and seek to identify the relationship between them by way of a moderating variable (e.g. “context”) (Venkatraman 1989). Contingency models have been used to express the alignment between business and IT in terms of “fit”, typically using Venkatraman’s (1989) scheme for defining fit in terms of six possible perspectives³. For example, Tallon (2007) use three of Venkatraman’s fit measures: mediation, moderation and profile deviation as means of assessing alignment at the process level. In this case, profile deviation measures the actual IT use against the IT use in the case of “perfect alignment”. Chan et al. (2006) develop constructs such as “shared knowledge”, “planning sophistication” and “environmental uncertainty” and look at the moderating effects of these on alignment. They use a partial least squares approach (Barclay, Higgins & Thompson 1995) in order to develop the causal relationships between the variables using empirical data.

Oh and Pinsonneault (2007), in their comparison of contingency-based and resource-based approaches, note that the former have been typically linear in how they respond to inputs and how they depict influences. On the other hand, dynamic environments have been characterised as non-linear (Sabherwal et al. 2001).

They also point to the methodological problems associated with how some of the variables have been operationalised and measured in the research to date.

“...most IS studies have analyzed fit by aggregating two or more component factors into a composite index. Although conceptually valid and simple, this two-dimensional approach can limit our ability to understand the complex and reciprocal relationships among multiple

³ Namely: mediation, moderation, profile deviation, matching, covariation and gestalts (Venkatraman 1989)

organizational variables (e.g., business strategy, IT strategy, and organizational performance)”. (Oh & Pinsonneault 2007, p.244).

Their research finds support for the non-linear contingency-based model but also points to the need for finer grained models of alignment to better understand which components of alignment contribute to firm performance in the dynamic environment.

2.4.5 Systems Theoretic Models

Researchers have used several abstractions drawn from systems theory in order understand and describe the structure and behaviour of the enterprise and thence the role of IT as a component part.

In a paper that marks a departure from the previous IT alignment work, Peppard and Breu propose “a co-evolutionary perspective as a new lens for theorizing about the dynamic, complex, and interdependent relationships between business and IS strategies” (2003, p.743). Their work is significant in several respects. Firstly, it challenges the notion of business strategy and IT strategy being separate entities and therefore in need of “alignment”. Secondly, they acknowledge the role human agency plays in the creation of the myriad informal relationships that are not represented in the traditional IT alignment models, but that play a large part in the alignment process. Their co-evolutionary model characterises a “dynamic process of mutual adaptation and change of business and IS strategies” (2003, p.747). They recognise several “co-evolutionary characteristics” that need to be considered in the adaptation model such as the absorptive capacity of the firm (i.e. its learning capacity), its path dependency, its value creation strategy (e.g. exploration vs exploitation, ambidexterity) and the shape of the firm’s fitness landscape.

Benbya and McKelvey (2006) characterise business and IT co-evolution at three levels: strategic, operational and individual. Like Peppard and Breu (2003), their idea of co evolutionary alignment is founded on organisational concepts such as shared understanding between business and IT organisations, communication and collaboration. However, there are still some similarities with the earlier models: the strategic and operational levels in their model correspond to the strategic and structural layers of the Henderson and Venkatraman’s model (1993; 1996) in terms of the components of alignment. Their conceptualisation of alignment as a dynamic co-evolution between business and IT also invokes the alignment-as-a-process perspective (Luftman 2000; Baker et al. 2011).

Allen and Varga (2006) note the strengths of the Complex Adaptive Systems (CAS) paradigm (Gell-Mann 1994) in modelling information systems (IS) themselves, and also in how IS relate to the enterprise as a whole. They also highlight the importance of IS co-evolving with the enterprise. Merali (2006, p.217) characterises the business-IT nexus as the “network-in-use” which, as she says, goes beyond viewing the IT systems and enterprises that use them as static structures and gets to the emergence of dynamic behaviour afforded by the interactions. This behaviour is inherently non-linear - with the many feedback loops operating at different levels - meaning that they are extremely sensitive to small changes in stimuli. Such a stimulus could be a change in the business environment or equally something within the enterprise itself such as an organisational or technology change. Vidgen and Wang (2006) apply the CAS paradigm to specifically look at the process-software interactions as adaptive ecosystems. Using Kauffman’s NK model (1993; 1995), they represent the interactions of processes and software services and specifically model an “evolutionary fitness landscape”⁴. This allows them to model how business and IT (as represented by the processes and services) might co-evolve by using agent-based simulation methods. While it does not reach any firm conclusions, their research provides an interesting direction in representation and modelling this business-IT domain, and in line with the previous discussion, provides another instance of fine grained reasoning about the business-IT relationship.

2.4.6 Other Perspectives on Alignment

Kearns et al. (2003) take a resource-based view in their approach when looking at knowledge sharing between the business and IT executive and how this influences the alignment of the business and IT strategies. In this instance, it is the collaboration processes and shared knowledge themselves that are the RBV’s “inimitable” resources that confer the competitive advantage. Their study does not specifically address the structural alignment dimension, or the dynamics of the business environment, but nevertheless shows how competitive advantage can be created at the strategic level. The author assert this is because the close collaboration can uncover new IT opportunities that will serve the business and thereby resulting in the creation of better strategies.

Reich and Benbasat (2000) explore alignment in purely organisational terms. Their study looks at several organisational constructs that integrate the business and IT organisations such as joint committees, direct communications between executives and various joint roles. They use an

⁴ Note this is not the same as evolutionary fitness in the context of dynamic capabilities (Helfat et al. 2007). In this case, it represents a purely endogenous organisational perspective.

empirical approach to ascertaining the degree of influence of these factors on both short-term (i.e. 1-2 year objectives) and long-term (i.e. shared vision) alignment. Their results are consistent with Kearns' et al. (2003) finding that collaborative and knowledge sharing factors support alignment, specifically short term alignment in their model. Reich and Benbasat's results for long term alignment are equivocal, with some suspicion being cast on the difficulty of articulating and measuring "vision".

2.4.7 Internal versus External Alignment

Given the conceptualisation of organisational agility arrived at earlier (section 2.3.1), of particular relevance to this research project is the notion of how an endogenous organisational aspect such as IT is "aligned" to an exogenous one such as the demands of the business environment. In the representative contributions summarised in it can be seen that the predominant view is an intra-organisational one: that once a strategic direction has been set and articulated (in response to the perceived environmental demands), the fundamental task is to align the resources, or measure the degree of fit, with this strategic direction. As argued by Coltman et al. (2015), this extant research has often been in terms of IT alignment to a single business strategy, regarding the latter as a fixed entity within the context of the focal organisation.

Table 2 - External and Internal Perspectives on Business-IT Alignment

Organisational Paradigm	External alignment Perspective	Internal alignment Perspective	Level of Analysis	Treatment of Organisational Dynamics	References
Contingency model of “fit” (Venkatraman 1989)	Business and IT Strategies as fixed entities based on organisational context.	Strategic Alignment model (SAM): Structural components (organisational and IT processes and infrastructure) are aligned across Internal/external dimension and also the business/IT dimension.	Organisation	Essentially a static model where a given context determines the alignment outcome.	(Henderson et al. 1996); (Reich & Benbasat 2000); (Avison et al. 2004); (Chan et al. 2006)
Contingency model	Revolutionary or evolutionary change in business strategies in response to environmental change.	Follows the SAM in terms of components of alignment.	Organisation	Punctuated equilibrium model where (static) periods of a given pattern of alignment can shift to another depending on business strategy being pursued.	(Sabherwal et al. 2001)
RBV	Industry characteristics (such as regulation and speed of technology change), linked trading partners and macro policy settings as antecedents of IT creating business value.	IT resources (technological and human) are associated with creating business value through efficiencies or competitive advantage.	Process	Dynamic organisational setting implied by competitive and macro environment constructs, but not explicit in any of the theoretical propositions. Dynamic capabilities not invoked.	(Melville et al. 2004)
Complex adaptive systems	Business strategy responding to business environment.	Components of alignment conceptualised at strategic, operational and individual levels of analysis	Multi-level	IS alignment as a dynamic co-evolving relationship between strategic, operational and individual levels with emergent properties.	(Benbya & McKelvey 2006)
Contingency model	Business strategy characterized as cost reduction, quality improvement and revenue growth.	Portfolio of IT systems determined as aligning to the three strategic categories.	Organisation	A non-linear model of internal alignment used as a method of modelling the organisation as an unstable system. Outputs (such as performance) have a non-linear relationship to inputs (such as environmental conditions).	(Oh & Pinsonneault 2007)

A Framework for Understanding the Role of Business-IT Alignment in Organisational Agility

Organisational Paradigm	External alignment Perspective	Internal alignment Perspective	Level of Analysis	Treatment of Organisational Dynamics	References
Contingency model	Business Strategy classified by value discipline (Treacy & Wiersema 1995).	Alignment of IT to business processes measured as deviation from an "ideal" profile for a given strategic value discipline.	Process	Incorporation of the dynamics of the organisational environment suggested as a future research area.	(Tallon 2007)
RBV	Firm financial performance	IT capabilities (technological, human and organisational) as antecedents of process dynamic capabilities and hence firm performance	Organisation	Process dynamic capabilities as the enablers of firm performance is the organisational paradigm, with the focus being on internal contributors to these capabilities.	(Kim et al. 2011)
Contingency model	Business strategy as the articulation of the firm's response to the environment.	IT strategy is maintained in alignment with business strategy through a dynamic strategic alignment competency that is based on current alignment, historical alignment and the maturity of the alignment processes.	Organisation	"Dynamic strategic alignment" as a dynamic capability that moves beyond the concept of alignment as an end state by invoking a dynamic aspect that is built on a mature planning process	(Baker et al. 2011)
RBV	The firm's competitive strategy as the antecedent of firm performance.	First, IT resources and IT capabilities are positively associated with firm performance. Second, that the IT support for competitive strategies and core competencies mediate this relationship.	Organisation	Environmental dynamism as a moderator of the relationships between IT resources and capabilities, and the strategic-level IT effects (on competitive strategies and core competencies).	(Wang et al. 2012)
Contingency Model	Business strategy responding to business environment.	"Operational" alignment extends the SAM structural alignment dimension by recognising 3 human factor dimensions: communication, knowledge and trust across the business and IT domains.	Organisation	Three business strategy scenarios are identified that implicate the amount of change needed within the organisation. Each scenario emphasises one of the three operational alignment dimensions.	(Wagner & Weitzel 2012)

A Framework for Understanding the Role of Business-IT Alignment in Organisational Agility

Organisational Paradigm	External alignment Perspective	Internal alignment Perspective	Level of Analysis	Treatment of Organisational Dynamics	References
Contingency Model	Business and IT strategies responding to business environment.	Extend the SAM alignment concepts by introducing “structural” alignment between corporate and business unit levels	Organisation, business unit	The concept of temporal alignment, which recognises that there are path-dependencies setup by past IT strategies that create inflexibility and limit options when adopting new business strategies.	(Reynolds & Yetton 2015)

2.4.8 Summary

This section has examined the major theories in business IT alignment that have emerged over the last couple of decades, the following points have been highlighted:

- The term business-IT “alignment” itself has been defined in several ways in the literature. Generally, its meaning has evolved from a static view confined to the strategic level, to a dynamic view that encompasses granular structural elements, such as processes, applications and organisation, and the business environment, as well as the strategic level.
- Many empirical studies have shown a positive relationship between alignment and firm performance including competitive advantage. There is, however, a scarcity of research that considers both a) a highly dynamic business environment, and b) allows fine-grained reasoning about where the locus of alignment actually is and under what conditions – although research has explored parts of this problem.
- The comparatively recent introduction of a systems theoretic perspective into this area has moved the underlying assumed state to be a changing dynamic one rather than steady-state equilibrium. This paradigm is a powerful way of modelling change and ties in with the themes explored in the previous section.
- Research in this domain shows there are multiple perspectives on exactly what “IT alignment” is, ranging across structural, behavioural, static and dynamic dimensions.
- Extant business-IT alignment literature takes a predominantly intra-organisational perspective; in other words, it assumes a relatively static business strategy against which the internal organisational components (including IT) are aligned. This raises a conceptual problem in relation the treatment of organisational agility.

2.5 *Conclusions from the Literature Review*

The literature review has highlighted several issues related to the problem domain:

- The flexibility of the business – IT landscape as an enabler of organisational agility is a known issue that has been the subject of research in both IS and organisational sciences.

- The concept of organisational agility, in response to the dynamics of its environment, has been tackled from several perspectives also. Strategically aligned IT is generally seen as an enabler of agility but this is qualified by circumstances that also see it as a constraint. This points to the need for the planned research to tease out these circumstances and how they are manifested in the organisational elements and their relationships.
- The ontological foundations for describing the organisation, its environment and the role IT plays within it, are far from being well formed and consistent. Research streams across multiple disciplines have contributed a variety of concepts and units of analysis. There is an opportunity to contribute to this area by providing a research-based, well-formed ontology to underpin the business – IT problem domain.
- Existing models and frameworks for looking at the relationship between IT and business are insufficient in terms of: their reasoning granularity, their treatment of dynamics, and their incorporation of the socio-technical dimension. There is an opportunity to build on the existing work by incorporating these additional elements to create a more complete picture.

In summary, there are two conceptual weaknesses in the traditional view of business-IT alignment as it relates to understanding the role of IT in organisational agility. The first concerns how the extant work largely ignores the dynamics of the external organisational domain. Indeed, as suggested by Coltman et al. (2015), future alignment research needs to consider the importance of the “IT innovation ecosystem”, meaning that the idea of alignment needs to move beyond the scope of the single firm. The second area of weakness concerns level of analysis of both the theoretical work and empirical studies, which has tended to be at an organisational level and hence short on the detail on granular mechanisms that contribute towards agility.

3 Research Methods

3.1 Introduction

At the outset, this research project set out to build a new theory of organisational agility: one that is able to represent granular business-IT alignment mechanisms and from this infer the implications for the overall organisational agility phenomenon. The novel theory is expressed as the *Framework*.

Gregor (2006) characterises five types of IS theory that span a range in terms of explanatory and predictive power. At one end of the spectrum are theories that merely intend to describe phenomena, and the other end are those that seek to explain and predict by developing a causal model. Gregor lists three perspectives on what “a theory” is in IS. Table 3 interprets the meaning of these perspectives for the Framework.

Table 3 – Positioning the Framework as an IS theory

Perspective*	Relevance for Framework
1. Theory as statements that say how something should be done in practice.	Provide generalisable propositions or heuristics that can guide management decision making in a real world setting.
2. Theory as statements providing a lens for viewing or explaining the world.	Provide a means of viewing the organisation’s business and IT components and inter-relationships such that their behaviour can be understood as it affects the organisation’s agility in its environment
3. Theory as statements of relationships among constructs that can be tested	Provide an ontology, a set of constructs and causal relationships that provide propositions about organisational behaviour.

* adapted from Gregor (2006, p.613)

By the assessment in Table 3 it is argued that the endeavour of developing the Framework is within the realm of IS theory creation. By Gregor’s taxonomy of theories, the intention at the outset was that the Framework represent a type IV theory which embodies explanatory but also predictive capability.

Based on this premise, a theory-building from case studies approach (Eisenhardt 1989; Eisenhardt & Graebner 2007) is adopted as the core research methodology. The remainder of this chapter describes the methodology in more detail, its rationale and the associated data collection and analysis procedures.

3.2 Theory-building Using Case Studies

3.2.1 Rationale

The research question and objectives influence the selection of an appropriate empirical approach. Organisations are the primary subject matter: organisations are complex social entities as well as technological ones (Morgan 1997). The research focus is on organisational building blocks as a way of elucidating agility at the holistic organisational level. The proposition being explored is that these building blocks comprise human and technological interactions that give rise to agility as an emergent property. Thus, there is a significant human behavioural dimension to the research.

Using an interpretive case study approach is a response to these characteristics. Case studies can provide a depth of qualitative information that is well suited to theory building (Eisenhardt 1989; Eisenhardt & Graebner 2007). Also, for researching complex and nuanced socio-technical phenomena, case studies provide a richness of contextualised data that is foundational for understanding “what is really going on” (Miles et al. 2013).

Whereas this research builds theory using empirical case studies, it does not follow a grounded theory approach (Glaser & Strauss 1967) by which the artefact being developed is *solely* based on the empirical data and there is effectively no preconceived starting position. As has been well established (Eisenhardt 1989; Eisenhardt & Graebner 2007) a case study approach can equally be used to extend *existing* theories. The onus is on the researcher to appropriately frame the research within the context of the existing theories and show how an inductive theory building approach is necessary, such as in its ability to “to explicate the complex social processes involved” (Eisenhardt & Graebner 2007, p.26). This accords well with the objectives of the research in this thesis.

One further note at this point about the philosophical position taken in this research project: Qualitative case study research into social phenomena is often equated with the *constructivist* paradigm, one that has developed in the social sciences. This holds that the world, as observed by humans (including the researchers themselves), is a social construction such that any true “objective” reality cannot directly be perceived. In this world view, the organisation is conceived in terms of complex, messy social interactions in which causality in the scientific sense is difficult to determine (Boisot & McKelvey 2010). Each person’s perception of the world is coloured through the lens of the meanings they ascribe to it. Notwithstanding these points and the subject matter of the research, this project is not taking a constructivist position. Rather, it aligns to the *pragmatic realist* tradition in which the objective reality is accepted and that generalizable causal models can be built

to represent stable patterns observed in a social context. In this viewpoint the guidance of Miles et al. (2013) is being followed. This view also accords with the notion that *both* the physical and social sciences are relevant in the IS discipline. In most if not all cases, the “information system” in question comprises human behaviour intersecting with material world entities such as technology.

3.2.2 Build-Evaluate Cycle

Guided by Eisenhardt (1989) and Yin (2009), the iterative build-evaluate case study approach is depicted in Figure 2. The steps in the diagram are described in Table 4.

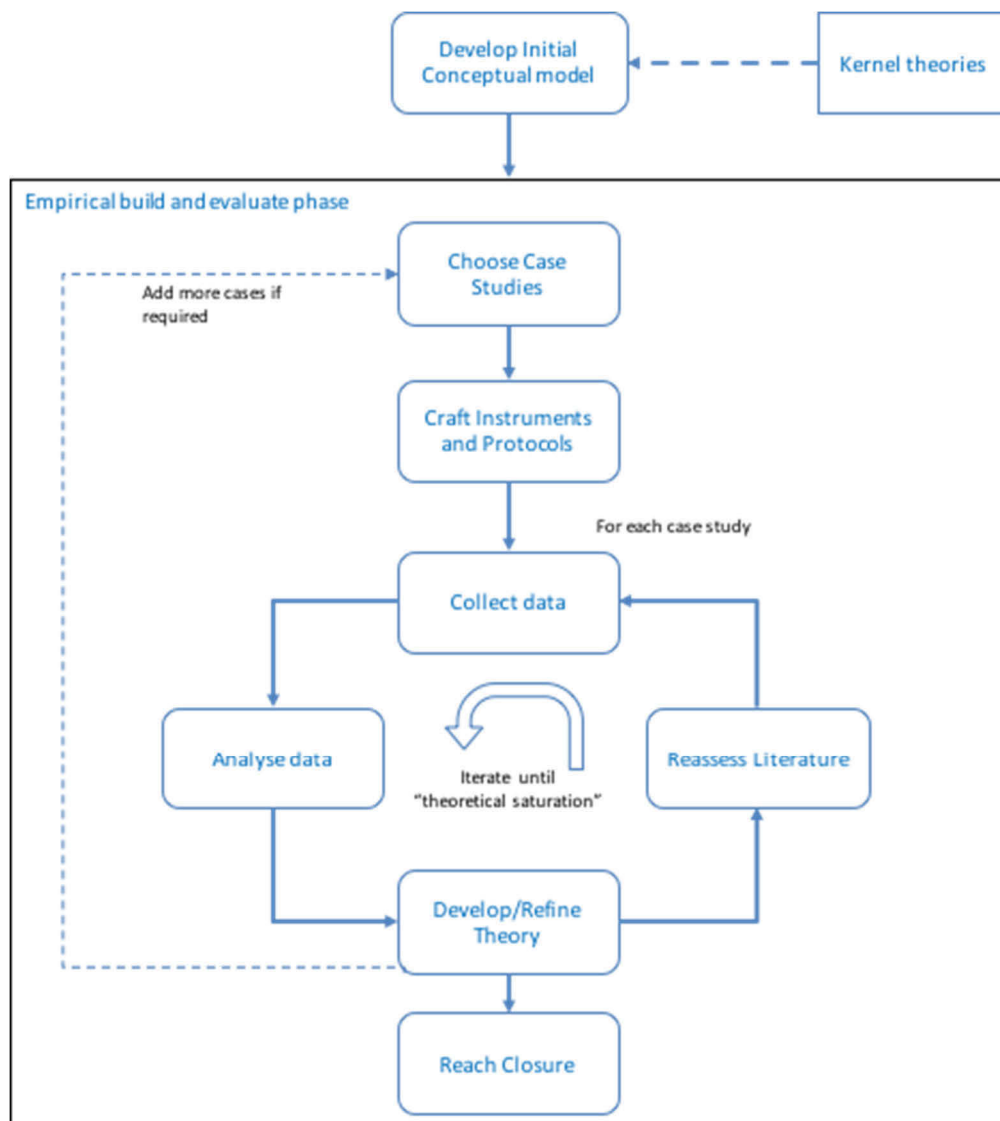


Figure 2 - Case Study-based Research Method

Table 4 - Case Study Method - Activities

Step	Description	Work Products
------	-------------	---------------

Develop Initial Conceptual Model	Using kernel theories drawn from management and organisational science, develop a conceptual model that appropriately provides a context for the research problem.	Initial conceptual model
Choose Case Studies	Select the cases that will form the source of the empirical data for the research	
Craft Instruments and Protocols	Develop the interview questions, and other tools to guide the data collection process. Develop ethical research procedures.	Interview Questions Participant Information Sheet Participant Consent form Research Data Repository Case Study Protocol document
Collect Data	This activity involves both the logistics of organising access to participants, obtaining consent etc. as well as conducting the actual interviews.	Interview transcripts Research Data Repository (updated)
Analyse Data	Analyse information received from interviews. Identify emerging concepts, themes and patterns. Compare information within and across case studies to date. Look for predictive power of emergent theory as new case studies are acquired.	Working Models: concepts, emerging themes and patterns
Refine/Develop Theory	Formalise working models and integrate into emerging theoretical framework. Apply extant theories to gain insight and input into refinement of theoretical constructs.	Conceptual Model (updated) Logic Model (updated) Case Study Report (updated)
Reassess Literature	Rationalise results against literature. Look for opportunities to integrate theory	Conceptual Model (updated) Logic Model (updated) Case Study Report (updated)
Reach Closure	Theoretical saturation (Eisenhardt 1989) the point at which there are no further additions or adjustments to constructs required to explain the data.	Case Study Report (final)

3.3 Selection of Case Studies and Participants

3.3.1 Case Selection

Rationale

A multiple case studies approach is considered stronger than a single case study for developing theory, since it allows a better delineation of concepts and relationships and provides greater analytic power (Eisenhardt & Graebner 2007; Yin 2009). The rationale underlying a multi-case study is *theoretical* sampling, as contrasted with *random* sampling from a population. In theoretical sampling the cases are selected on the basis of their potential to extend the theory, provide contrary but explained results or to eliminate alternatives (Eisenhardt & Graebner 2007). The premise here is that a phenomenon or finding from one case is replicated across other cases, thereby strengthening the original finding, in the manner that multiple experiments can corroborate an original result in

the experimental sciences. Two types of replication are possible: firstly *literal* replication, where the cases are selected in order to predict similar results; or secondly, *theoretical* replication, where the cases are selected in order to predict contrasting results, but for an anticipated reason (Yin 2009).

Application to the Research Project

The following general rationale for selecting case studies was applied:

- The “case” unit of analysis is an *organisation*. An initial case is chosen that represents the target scope of the study, namely an organisation (Organisation A) that a) exists in a dynamic business environment, b) that requires agility to enable adaptation to that environment, and c) is a significant user of IT to enable its business.
- From this initial case, via gathering of empirical evidence, a provisional theoretical model is then developed that explains - in terms of constructs, relationships and propositions - how the relationship between business and IT, or “alignment”, in turn, effects the agility of the organisation.
- A second case study organisation (Organisation B) is chosen that falls within the same scope parameters as the first (i.e. in terms of environmental dynamics, need for agility and IT as a business enabler). We expect replication of similar results or contrasting results in Organisation B as compared to Organisation A that is consistent with the explanation provided by the developing theory.
- Another factor is introduced into the selection of Organisation B, namely Industry Sector. While not strictly required by this methodology, it is argued that the replication of findings across industry sectors would improve triangulation of data and therefore add further robustness to the emergent theory. Importantly, the theoretical model should be able to explain why the theory holds in such cases.
- Further cases are selected according to the principles of theoretical sampling in order to continue development to theoretical saturation (Eisenhardt 1989).

Table 5, below, summarises the case study selection attributes and criteria.

Table 5 - Case Study Selection Attributes

Attribute of Organisation	Common to all Cases	Varied Across Cases
Organisational Size: large (>500 employees)	✓	
Business Environment: commercial, competitive, turbulent	✓	
Significant user of IT to enable business	✓	
Industry Sector		✓

3.3.2 Case Study Organisations

Based on the above rationale, three case study organisations were selected over the course of the empirical research timeframe. A précis is provided in *Table 6 - Synopsis of Case Study Organisations*

Table 6 - Synopsis of Case Study Organisations

Pseudonym⁵	Industry	Environment	Business Strategy	Structure	Culture
ABC	IT Services	Commercial, dynamic, competitive. Some multinational clients.	Traditionally in the Defender-Analyser category, but moving to Analyser-Prospector ⁶ Large portfolio of service offerings - competes with both large multinationals as well as niche players. Deliberate strategy to be a leader in some markets.	Global, centralisation of common functions, processes and IT. Business units have global reporting structure. Regional operating companies provide local presence for global operations.	Strong traditional IT culture, facing transformation to respond to current agile technology trends. Combination of long career IT staff vested in traditional IT models, and a new generation of savvy technologists.
Pharma Inc	Pharmaceutical (R&D based)	Commercial and dynamic environment that is also highly regulated.	Analyser Small portfolio of market leading niche products. Looking to extend portfolio by acquisitions that fit existing strengths.	Global with some centralisation of some functions – especially IT Local operating companies requiring autonomy to deal with local regulatory environment.	Traditional Pharmaceutical industry. Strong process focus. High mobility of staff within the industry, hence many have worked for competitors.
SupaMart	Retail	Commercial, competitive on cost, quality and convenience. New market entrants challenging traditional players' dominance	Traditionally Defender but moving to Analyser and venturing into Prospector in new lines of business through acquisitions	National network of retail stores (supermarkets and general merchandising). Large supply chain infrastructure connecting back to suppliers	Strong branding is associated with quality as well as low prices for the consumer. Customer service focus together with efficiency of core processes such as supply chain logistics.

⁵ To protect the anonymity of the case study organisations and the participants, pseudonyms are used throughout to refer to them.

⁶ Typology after Miles and Snow (1978): “Defender” – focus on standard, high quality products at low cost; “Analyser” – maintain stable core products while seeking new product opportunities; “Prospector” – seek new market opportunities and are the creators of change in the market.

3.3.3 Case Study Participants

Rationale

There are two factors to consider in the selection of the participants:

- Theoretical sampling requires that the multiple viewpoints are chosen such that the information needed to develop and extend the theory is obtained. In other words, the viewpoints need to span the scope of the developing theoretical framework, for instance in the current project, strategic level as well as operational level information about the organisation is required.
- Collection of data from interviews is subject to potential bias derived from the individuals involved and their particular interests or political agendas (Eisenhardt & Graebner 2007). The use of knowledgeable informants and obtaining multiple perspectives from diverse viewpoints on the same phenomenon is a way to mitigate this problem.

Application to the Research Project

Informed by the preceding rationale, the strategy adopted is to select multiple interviewees across two dimensions within the organisation:

1. Across hierarchical management layers, these are listed in Table 7 below;
2. Across core organisational capabilities. A representative subset of the organisation's core organisational capabilities will be selected (which will vary across cases). The objective is for all management levels to be represented for each selected capability.

Table 7 - Participant Management Levels

Management Level	Description	Key Perspectives
Executive	includes CEO, and members of executive leadership team (normally direct reports to CEO)	Characterisation of the organisation's business environment dynamics, the business strategy, the IT strategy, the perceived agility of the IT to business change; the perceived level of alignment of IT to business objectives.
Chief Information Officer	Responsible for the provision of internal IT to the organisation	The characteristics of the IT Systems portfolio, level of integration, complexity, perceived level of fit to business needs
Operations Management	Responsible for managing the delivery of the organisation's capability to its customers	Number and complexity of business processes, level of definition of processes, areas of perceived rigidity, level of IT support for processes
Operational staff	Responsible for the delivery of the organisational capability to the stakeholders (e.g. customers)	Perceived business process complexity; perceived level of IT support for process; perceived need for

agility. View of current systems being used in terms of flexibility.

Table 8 - Number of interviews by management level

	Operations	Operations Management	CIO	Executive
ABC	2	2	1	3
Pharma Inc	2	2	1	2
SupaMart	2	4	1	1

3.3.4 Other Information Sources

Information obtained from interviews is supplemented by other documentation, mainly to corroborate “factual” information. These sources include:

- Corporate website;
- Annual reports;
- Other strategy documents (as permitted).

3.3.5 Case Study Questions

For case study-based research, there are potentially relevant questions to be considered at five levels, as indicated by Table 9 (Yin 2009). The focus in this document is on Levels 1, 2 and 3 as they directly relate to the case studies themselves.

Table 9 - Case Studies - Levels of Questions (adapted from Yin 2009)

Level of Question	Objective	Application to this research project
1. Interviewee	Questions asked of specific interviewees.	Refer to in the Appendix for the interview guide questions
2. Case	Questions about the case to be answered by the investigator.	This is the primary focus. Questions at this level include: • What are the emergent themes in terms of the theoretical framework’s conceptual model? • Is the conceptual model adequate? How can it be extended? What relationships and propositions can be derived to support the empirical data? • What are the lessons learned and what methodological implications are there for subsequent cases?
3. Across Cases	Questions about patterns of findings across cases.	• How do the case findings relate to the specific circumstances of the individual organisation? • What appears to be independent and is therefore a candidate for generalisation? • What contra-findings were not anticipated by the theoretical Framework?

4. Whole Study	Fundamental research questions relating to the study as a whole.	Not applicable at the case study level
5. Normative	Normative questions about policy recommendations and conclusions going beyond the scope of the study.	Not applicable at the case study level

The interview questions have been stratified according to target management levels shown in Table 7, with considerable overlap across the categories. The set of guide questions is included in the Appendix.

The intent of the questions is to prompt a detailed response from the participant, rather than a simple statement of objective fact. This is consistent with the qualitative nature of this study in seeking to understand the socio-technical complexities that are central to the workings of the modern organisation.

3.4 Data Collection and Analysis

The primary means of data collection was via semi-structured or focused interview (Merton, Fiske & Kendal 1990). Public documents such as the annual report and corporate website were also used for background fact checking. For the interviews, a guide set of open style questions designed to probe the research problem space were used (Yin 2009). At the same time a conversational style eliciting detailed responses and opinions was encouraged. To gain multiple perspectives and reduce any “political” bias, interviews were conducted across three broad levels in the organisational hierarchy (as listed in Table 7). The questioning for each management level was tailored, but also retained a degree of overlap across levels.

For each case study, the research data was coded according to the procedure described by Miles et al. (2013). This process was assisted by the use of NVivo 10 software and proceeded as follows:

- For each Case Study:
 - *Identify participants*
 - For each Participant:
 - *Conduct Interview.* Informed consent was obtained and the interview recorded.
 - *Create Transcript.* A complete transcript was prepared and loaded into the analysis software.

- *Undertake first cycle coding.* At the first level the interview transcripts were examined and labelled with codes that primarily described the topics covered and could thus be used as an index to the content. Codes emerged, either as suggested by the data itself, or as informed by a predefined schema⁷. The latter, in this case, is the *a priori* Framework conceptual model.
- *Undertake second cycle coding.* At the second level, more abstract categories are developed that respond to patterns in the data. These may refer to emerging themes, causes or explanations, relationships or represent initial theoretical constructs (Miles et al. 2013). These codes build on the initial set of descriptors as a way of further summarising and condensing the data. Consistent with the deductive approach suggested by Miles et al., pattern matching uses the Framework conceptual model in a predictive sense to match what was observed in the case study to what was expected.
- *Refine/Develop Theory.* Explanation building takes observed phenomena and develops the theoretical constructs as explanations. Pattern matching and explanation building in terms of the Framework form the two analytic processes that are interleaved to provide a build-validate cycle. In each case study this entailed firstly, mapping emergent themes into the framework conceptual model to identifying the existence of the posited relationships, thereby validating the model; and secondly, to use the richness of the empirical data to further refine these relationships. The previous case studies included into the theory development step to ensure explanations are consistent or to challenge the existing ones. As revisions were made to the Framework, the relationship to extant literature was reviewed for any additional theoretical insights and substantiation.
- *Conclude Case Study.* At the conclusion of the case study the data collection and analysis processes followed were reviewed for “lessons learnt”, so that adjustments could be made (Yin 2009). This step was particularly important for the first case which was the pilot for these processes.
- *Select Next Case Study.* In keeping with the concept of theoretical sampling further cases study organisations were chosen based on their ability to test the Framework in in different circumstances that would enhance generalisation. Examples of this

⁷ This is described by Miles et al. (2013) as inductive and deductive coding, respectively

were exploration of different organisational capabilities and business processes within an organisation in a different industry, but where the behaviours correspond and have the same explanation in terms of the Framework.

3.5 Ethical Procedures

Principles

As this research involved human subjects in a real life setting, there was an obligation to use ethical research practices (Yin 2009). Further, there was a requirement to conduct the research in accordance with the Australian Code for the Responsible Conduct of Research (NHMRC 2007) and the relevant UTS policies on human research. The UTS Human Research Ethics Committee provided approval for the research to proceed (approval number 2014000025) subject to these principles:

- Any information provided by a participant to the researcher was done so under informed consent.
- All information obtained from participants was de-identified in the subsequent analysis and in any published work product.
- Recordings of interviews were only to allow for transcripts to be made. They were destroyed at the completion of the data analysis phase.
- Primary research material (recordings, transcripts) were held securely and were not published.

Obtaining Consent

Prior to the conduct of any interview, the participants were provided with:

- An information sheet providing detail on the project and what participation would entail, including provision for opting out. A sample is provided in the Appendix.
- A form by which the participant could give written consent to proceed.

3.6 Summary

This chapter has presented and explained the rationale for the methodology used in this research project, it has covered:

- The positioning of the Framework as a theoretical artefact.

- The application of a qualitative, interpretive theory-building approach based on case studies. The research endeavour is to build a novel (theoretical) artefact to explain and predict organisational phenomena.

4 Initial Theoretical Development

4.1 Introduction

The purpose of this chapter is to present the initial Framework conceptual model, discuss the process by which the model was created and the associated rationale. The model developed in this chapter forms and basis for the subsequent validation and enhancement over the course of the empirical case studies. The content covers these points:

- Key requirements that Framework needs to satisfy.
- The application of a microfoundational lens as the fundamental organising principle for Framework.
- Foundational concepts that derive from the extant literature. These are proposed as providing a solid ontological foundation for the main constructs.
- Relevant existing theories that derive from the literature review are included as both an important context for the research, but also as sources of additional insight as the research progresses.

4.2 Framework Requirements

The following requirements have been developed from Gregor's (2006) specification for good IS theory and informed by the conclusions from the literature review:

General Requirements

- Representation. The means of representation, the constructs of interest and the relationships between the constructs.
- Explanations. A desirable state is for all logic contained within the framework to be explicit. In other words, any explanation generated by the Framework should be able to be justified in terms of the Framework. A corollary to this is that the Framework is logically consistent: that it is not possible to generate mutually conflicting explanations.
- Predictive Power. The Framework aims to make propositions about the organisation that have some degree of generality.
- Parsimony. As with any good science, the principle of parsimony should apply: it is as simple as possible and the number of assumptions is held at the minimum possible.

- Utility. The objective of the Framework being relevant to practice requires it to have utility. There should be ease of use and the explanations generated should be of value to the organisational stakeholders targeted.

Domain Specific Requirements

- Ontology. The literature review found various inconsistencies and ambiguities in the concepts used in this problem domain. It is thus important that the ontology that underlies the Framework constructs is not only well defined, but also provides a clear line of connection to the extant research, so that it is always clear how the terms and concepts are being used.
- Granularity. A finding was that existing theories of business-IT alignment are, with some exceptions (e.g. Tallon 2007) not fine grained enough to support inferences about agility, for example, at the organisational capability level. The representation must therefore be able to support fine grained components.
- Dynamics. A finding was that the well-established theories of business-IT alignment have tended not to treat the dynamic element of the business environment convincingly.
- Socio-technical dimension. Organisations are as much social objects as they are mechanical artefacts (Morgan 1997). Given the human behavioural dimension involved in organisations, there is an imperative for the Framework to accommodate the viewpoint of the technology-in-use suggested in the organisation science literature (Orlikowski & Scott 2008; Leonardi & Barley 2008; Zammuto et al. 2007; Yoo & Boland 2012), as a means of shedding light on the role of human agency in the overall question of agility.

4.3 Design of the Conceptual Model

In designing the Framework's conceptual model, it is clear there are two different types of component required. One is structural: a suitable abstraction of organisation's business and IT elements, their relationships and their properties. The second component is the dynamic dimension that captures the *behaviour* of the structural components that, in line with the research goal, provide the required insights into the organisational mechanisms that either give rise to agility or restrict it.

Therefore, the Framework's conceptual model includes the following object types:

Structural Elements

- Organisational building blocks derived from extant theories: including *organisational capabilities*, *organisational routines* and *technology affordances*.
- Relational constructs that exist between the building blocks. These are suggested by extant theory but are also the subject of empirical validation and enhancement. Examples are *interpretation*; *orchestration*; *agency*; *learning* and *improvisation*.
- An ontology for both subtypes, or in other words, definitions that are founded on well-established extant theoretical models.

Behavioural Element

- *A priori*, this component is an abstraction that is not instantiated in the Framework conceptual model. As the dynamic perspective on the organisation emerges (from the empirical part of the research) behavioural elements are represented using systems dynamics causal loop diagramming (Sterman 2002).

4.4 Microfoundational Research Lens

As stated in section 1.3, a research question being addressed in this thesis is the elucidation of a fine-grained model of the relationship between business and information technology (IT). IT can be viewed at multiple levels of analysis within the organisation, from strategic firm-level considerations through to the operational, and how individuals actually use IT systems. The relationship of the micro to the macro, especially as it concerns the effect of IT use, is the motivation for applying a microfoundational lens to the concept of organisational agility.

The premise underlying the “microfoundations movement” is that collective concepts (such as organisations) should be viewed in terms of their constituent parts. This appeals to the logic that macro-level organisational phenomena must have their origins in the actions of individuals (Felin et al. 2012; Felin, Foss & Ployhart 2015). The nature of the aggregation of lower level micro concepts, via mid-level, into macro ones, has also occupied researchers (e.g. Molina-Azorín 2014; Storbacka et al. 2016). Extant microfoundations research has been applied to organisational-level phenomena such as organisational capabilities (Sirmon, Hitt & Ireland 2007; Eggers & Kaplan 2013), ambidexterity (Eisenhardt et al. 2010), absorptive capacity (Lewin, Massini & Peeters 2011; Martinkenaite & Breunig 2015), organisational learning (Brusoni & Rosenkranz 2014) and dynamic capabilities (Teece 2007; Argote & Ren 2012; Helfat & Peteraf 2015; Schneckenberg, Truong & Mazloomi 2015).

Applying a microfoundational lens to the phenomenon of organisational agility has the following benefits. The first is to provide insight into the actual mechanisms within organisations that lead to the macro-level OA phenomenon. Focussing on mechanism offers a stronger model of relational causality⁸ whereby the lower level constructs implicate the higher-level aggregated view. The second motivation concerns the multiple levels of analysis that inherently exist in this research domain and that has already been alluded to. IT is used by individuals, supports business processes, and in turn business processes comprise organisational capabilities. The flexibilities and inertias at these levels implicate the ability to the organisation as a whole to respond to environmental change. A microfoundational analysis provides a demonstrated framework for understanding causal relationships across levels of analysis (Felin & Foss 2011; Felin et al. 2012). Additionally, scholars have pointed to the need for improved understanding of the relationship between process-level flexibility and organisational agility (Tallon 2008).

The model of microfoundational causality is illustrated by the Coleman "bathtub" diagram (Coleman 1990) depicted in Figure 3. Here the macro-level (social) phenomenon (such as organisational agility) in the top right of the diagram, is explained in terms of the lower level causal mechanisms via pathways 1 – 5, rather than terms of macro-level mechanisms (path 6). The model admits multiple levels of analysis, where a theoretical conceptualisation at one level can appear as a black box to a higher level theory (Devinney 2013) without the need to decompose the black boxes any further (for example path 7 in the diagram). Devinney also points out that some theories are inherently irreducible in the sense that they are explicable at the macro level and that lower level theories and concepts are necessary but not sufficient to explain them.

Teece's characterisation of the microfoundations of dynamic capabilities (Teece 2007) is as an example of a mid-level theory. An organisational-level concept, the dynamic capability, is disaggregated into the capacities of sensing and seizing of an opportunity, and reconfiguration of resources to maintain competitiveness. Each of these are then characterised in terms of the requisite skills, processes, procedures and technologies. Thus, the microfoundational constructs Teece invokes are still at a level of aggregation well above the behaviour of individuals.

⁸ When compared to other models of causality such as the probabilistic models that are common in quantitative IS research (Gregor 2006).

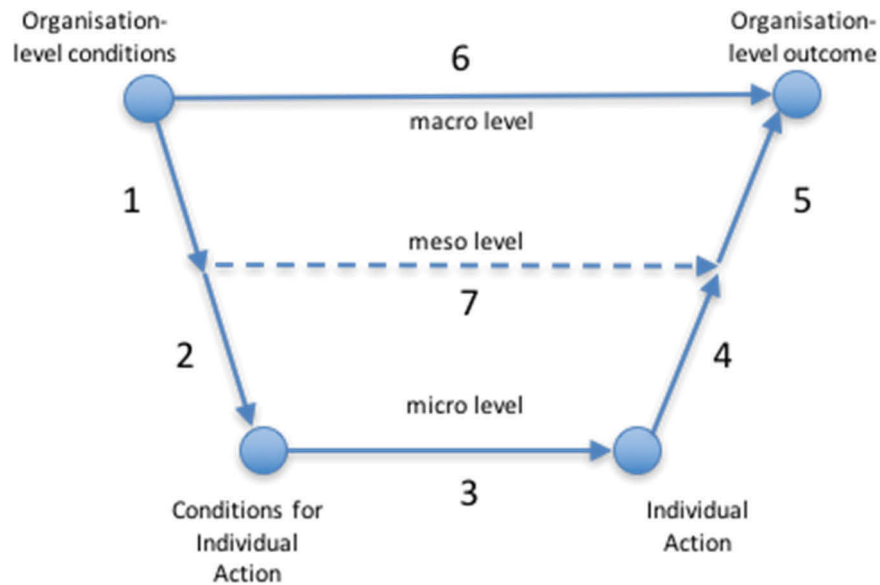


Figure 3 - Coleman bathtub diagram illustrating multiple levels of analysis

Table 10 summarises some prominent microfoundational research contributions in organisation and management science. Several themes emerge. Firstly, that microfoundational elements are not necessarily at the individual level, with a variety of multi-level models being proposed that include aggregation across levels. Second, the microfoundational components themselves are conceptualised in many ways: as hierarchies of capabilities, as routines, as individuals, as structures, and as interactions between these elements. In other words, there is no strict reductionist taxonomy that applies here; rather, that organisations, as complex social objects, require more than one analytical lens in order to make sense of their macro phenomena. Notwithstanding this, the resource based view (RBV) of the organisation, in terms of resources, routines and capabilities as organisational building blocks, continues to feature prominently in these works.

Table 10 Examples of microfoundations research in organisation and management science

Author	Macro Phenomenon	Microfoundational units of analysis
(Teece 2007)	Firm performance in dynamic environments	Sensing, seizing and reconfiguring as classes of dynamic capability
(Sirmon et al. 2007)	Firm value creation	Resource management decomposed into a set of sub-processes for structuring, bundling and leveraging resources.
(Eisenhardt et al. 2010)	Firm performance in dynamic environments	Manager's cognitive abilities applied to solving the efficiency vs. flexibility tension.
(Lewin et al. 2011)	Firm absorptive capacity	Organisational meta-routines expressed as practiced routines that comprise the firm's absorptive capacity.

Author	Macro Phenomenon	Microfoundational units of analysis
(Felin et al. 2012)	Organisational routines and capabilities	A combination of constituent components: Individuals, processes and structure; and the interaction between these components.
(Argote & Ren 2012)	Firm competitive advantage	Transactive memory systems as foundations for dynamic capabilities that enable the application of corporate knowledge.
(Eggers & Kaplan 2013)	The development and deployment of organisational capabilities	Organisational routines as the building blocks of capabilities, with management cognition as the mechanism to match capabilities to environment.
(Brusoni & Rosenkranz 2014)	Organisational learning	Organisational learning as a multi-level construct: social and cognitive foundations at the individual level are bridged to the organisational level via leadership and routinisation.
(Schneckenberg et al. 2015)	Innovative capabilities	Managerial structures, systems, processes and procedures as the constituents of organisational learning and knowledge management that are the foundations of innovative capabilities.
(Martinkenaite & Breunig 2015)	Absorptive capacity	Absorptive capacity as a multi-level phenomenon comprising individual and organisational-level learning capabilities and their interactions.
(Helfat & Peteraf 2015)	Dynamic managerial capabilities	Managerial cognitive capabilities unpinning the three classes of dynamic capability: sensing, seizing and reconfiguring (Teece 2007)
(Storbacka et al. 2016)	Co-creation of value	Actor engagement leading to resource integration as the source of value co-creation.

It is worth noting that the strong view of microfoundations has attracted some controversy. The objectives of the microfoundations movement follow the scientific reductionist tradition where causal mechanisms are sought and follow from the analysis of the component parts of the phenomenon under study. However, translation of “absolute reductionism” to the social sciences has been debated over many decades, where the primacy of the individual over the collective, from a methodological point of view, has been disputed (Felin et al. 2015). Scholars have criticised its applicability to the study of organisational building blocks such as routines on the basis that the over-emphasis on the individual understates the role of *emergence* that occurs as a result of complex inter-relationships between these individuals (Hodgson 2012; Pentland 2011). In addition, Pentland notes that the relationships between *actions* are important as well as those between individuals.

In summary, the microfoundational lens provides an established means to handle a multi-level model of causation and is therefore a relevant tool for the objectives being pursued in this research project. However, the notion of emergence is also being recognised as an important ingredient: that

the inter-relationships between the organisational building blocks, their complexity collectively form an “ecosystem” which demonstrates emergent behaviour.

4.5 Foundational Framework Concepts

This section presents a discussion of the foundational concepts that inform the creation of the Framework’s conceptual model.

4.5.1 Organisational Capabilities

Addressing the foundational concepts in a top-down manner, at the top level exists the “organisation” as an entity and the exogenous environment that it exists within. Here the basic idea is that an organisation exists in a coevolutionary relationship with other organisations. The “unit of coevolution” here is the organisational capability – in other words, the adaptive response that each organisation makes as a result of the environment it is operating in (including other organisations) is realised as a change in the organisational capabilities that it can deploy. This is fundamentally a viewpoint driven by the resource based view (RBV) of the firm (Wernerfelt 1984; Barney 1991) in which the competitive advantage is manifested in terms of a configuration of the organisation’s assets and resources to realise those capabilities that provide the competitive edge. “Resources”, as we shall see, are the people, the processes and the technologies that are the core of how the organisation operates. The characterisation of coevolution of organisations in these terms is strongly influenced by the capabilities literature, in particular Helfat et al. (Helfat 2000; Helfat & Peteraf 2003; Helfat et al. 2007).

In Figure 4 two (arbitrary) organisations are represented to show the two intersecting “fitness landscapes” both centred on the concept of organisational capability. Again this is influenced by Helfat et al. (2007) who delineate these aspects for *dynamic* capabilities; and also Miller (1992), who uses the similar concepts of “environmental” and “internal” fit in relation to organisational capabilities. In the following, the terms from Helfat et al. (2007) are used and applied to organisation capabilities. “Evolutionary fitness” applies to the extra-organisational perspective where capabilities are selected for based on their fitness in the competitive organisational environment. “Technical fitness” applies to the internal organisation perspective that relates to the internal working of the organisation to realise the capability in question. Measures of technical fitness would be in terms of efficiency, for example, quality per unit cost; whereas measures of evolutionary fitness would be in terms of competitive advantage, for example, market share. The important conceptual point is that the two fitness landscapes are inter-related but the drivers for fitness in each are independent.

The organisational capabilities are a function of the resources that are configured or orchestrated in such a way to deliver them for the organisation, to allow them to make a living. The model depicts the business processes of the organisation as delivering the organisational capabilities under the “oversight” of the dynamic capabilities, which operate at a meta-level to *sense* what the environment requires in terms of capabilities, to *reconfigure* the resource base to re-align it to the changed capability requirement, and then to *monitor* this alignment (Teece 2007; Schreyogg & Kliesch-Eberl 2007). This conceptualisation of business process is consistent with how authors have characterised the building blocks of organisational capabilities in terms of organisational routines (Dosi et al. 2000; Volberda & Lewin 2003). This precisely delineates the “doing” part - the business process – from the “outcome” - the capability. In other words, the “how” from the “what” respectively. Here the capability is what provides the objective or intent that is being served by the business process. Equating business processes to organisational routines has other ontological implications which as we shall see, emerge at the next level of decomposition.

In summary, at this level, we have the exogenous market force (or another organisation) creating selection pressure on a capability and at the same time the endogenous landscape says how well the organisation can support it or indeed how quickly it can be pushed to the background in the favour of another capability – thereby capturing essence of the organisations agility. The interlinking of both internal and external landscapes captures the tension that exists between the two.

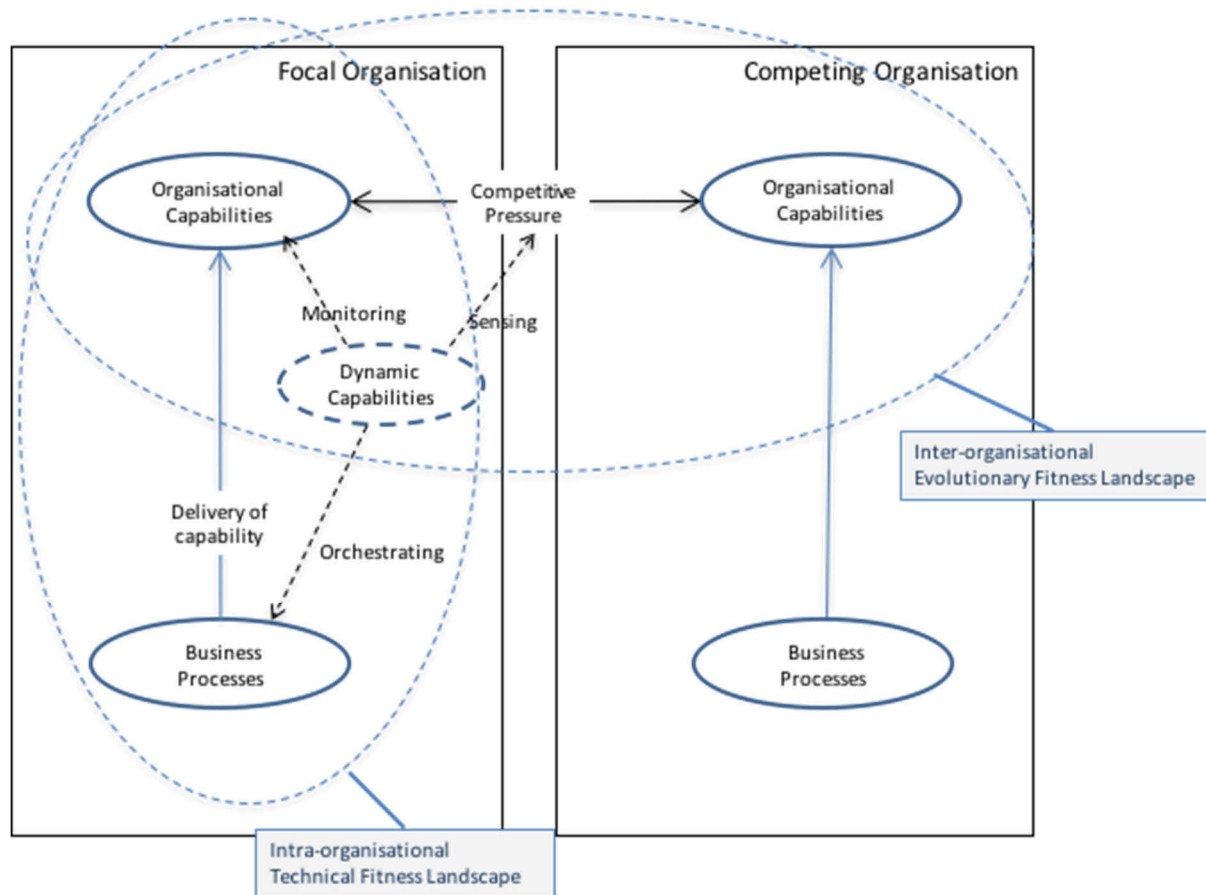


Figure 4 – Organisational Capabilities

4.5.2 Business Processes

The next level down decomposes the intra-organisational perspective and is represented in Figure 5.

A central component of the Framework is the reconceptualization of the “business process” as a socio-technical object. The foundation for this is the theory of organisational routines which distinguishes “ostensive” and “performative” aspects (Feldman & Pentland 2003; Pentland & Feldman 2005). By applying this idea to business processes, the non-determinacy of human action is intrinsically factored in to the concept. That is, the business process becomes more than merely a designed artefact that can be deterministically executed. This duality of aspects says that the *practice* of the business process is a non-deterministic event that is heavily contextualised by the participating human actors. This performative aspect brings with it human factors such as motivation, skills, tacit knowledge and experience which intrinsically means the process may not deliver what was “intended”.

The other part of the ostensive/performative duality is a feedback loop whereby the ostensive aspect of the business process is realigned based on the performative experience. “Learned” is used in a wide sense here: it not only refers to an intentional activity but also it is the *necessary* by-product of performative-ostensive relationship. So, in this latter sense, it is inevitable that the practice will induce a drift away from the process-as-designed. This is consistent with the Feldman and Pentland’s original characterisation of routines (Feldman & Pentland 2003) and their more recent work on modelling this experiential learning (Pentland et al. 2012).

This conceptualisation marks a point of departure from the traditional IS perspective on business processes (e.g. van der Aalst, ter Hofstede & Weske 2003; Hammer & Champy 1993; Weske 2012) and suggests something has been missing, especially when it comes to human-centric processes. The strength of this concept in relation to the research project is clear: the human agency creates a point of flexibility (or inflexibility) in the organisation and therefore business process conceptualised in this way creates an opportunity to examine at a granular level where these flexibilities or rigidities lie. By linking business processes to the organisational capabilities they are realising – in other words the capability that is the outcome of the business process(es) - a conceptual bridge is created between the agency at the granular (individual) level and the technical fitness of the capability. It thus gives a perspective on the “alignment” of the business process to achieving the organisation’s goals in terms of realisation of organisational capabilities.

In passing, it is noted here that there is a parallel here with the Strategic Alignment Model’s (SAM) (Henderson & Venkatraman 1993; Henderson et al. 1996) concept of strategic fit and functional integration, which respectively take external and internal views of organisational alignment. There are however important differences between that model and the Framework being developed here. Firstly, the model depicted here is intrinsically in dynamic, whereas the SAM’s concept of “fit” essentially static where any change is intentionally driven (e.g. by management during the course of a strategic planning exercise). A second difference is how idea of strategic alignment is represented. The building block view of the organization taken in Figure 5, shows the “levers” that strategies can operate on rather than strategy itself. Thus, strategy settings can operate on these building blocks, e.g. in terms of the value propositions that organisational capabilities present to the marketplace, or the efficiency of business processes. What this model says is that strategies (be they business or IT) need to recognise the connectedness of the two fitness landscapes: that one implicates the other.

4.5.3 Technology-in-use

Here, “technology” will typically refer to an IT system that is being used to support the business process. As shown in Figure 5, the interaction between the human actor and the technology uses the concept of “technology affordance” (Zammuto et al. 2007). Technology affordance is modelled as part of the *relationship* between business process and technology and refers to a *potentiality* of use of a technology object. The affordance thus is not a material property of the object, as a function or feature might be. Similar to the concept of the performative routine, there is a situated aspect to an affordance that invokes the intention of the user. Thus, for example, the affordances offered by a screwdriver are different depending on whether the user wants to tighten a screw or lever the lid off a tin can. The corollary of this is that the affordances of a technology object are different depending on the user - (Leonardi 2011). Despite this subjectivity, technology affordances can be purposefully designed to achieve a task. Modelling the interaction of technology with the user in this way sheds another light on what “business-IT alignment” means at the operational level (Majchrzak & Markus 2012) – it provides the idea of “technology-in-use”.

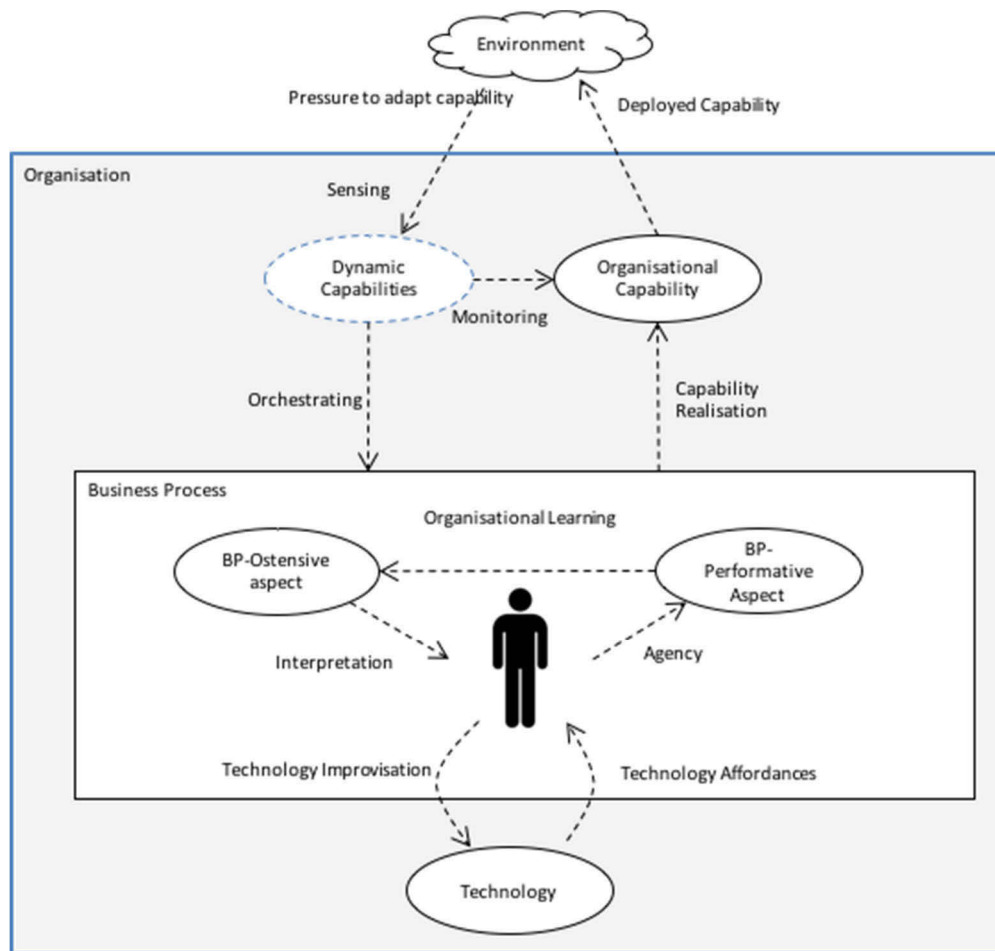


Figure 5 - Business Process as a Socio-technical Object

Expressed in terms of the Coleman diagram⁹ (Figure 6), the microfoundational model of the theoretical framework is depicted over three conceptual levels of analysis. At the individual level, the outcome is what is practiced by the human agent which is a function of their skills, motivation and so on. Also at this level is the action they take in response to the technology affordances and constraints that are presented to them. The aggregation of the outcomes of these individual-level actions give rise to the evolution of the business process as it adapts through practice, as previously described. In turn, it is the aggregate effect of this business process evolution that defines the agility outcome at the organisational-level.

⁹ It is important to note that although this offers a concise view of the component parts of the model and summarises the causal elements, the Coleman diagram is a somewhat crude simplification (Felin et al. 2015).

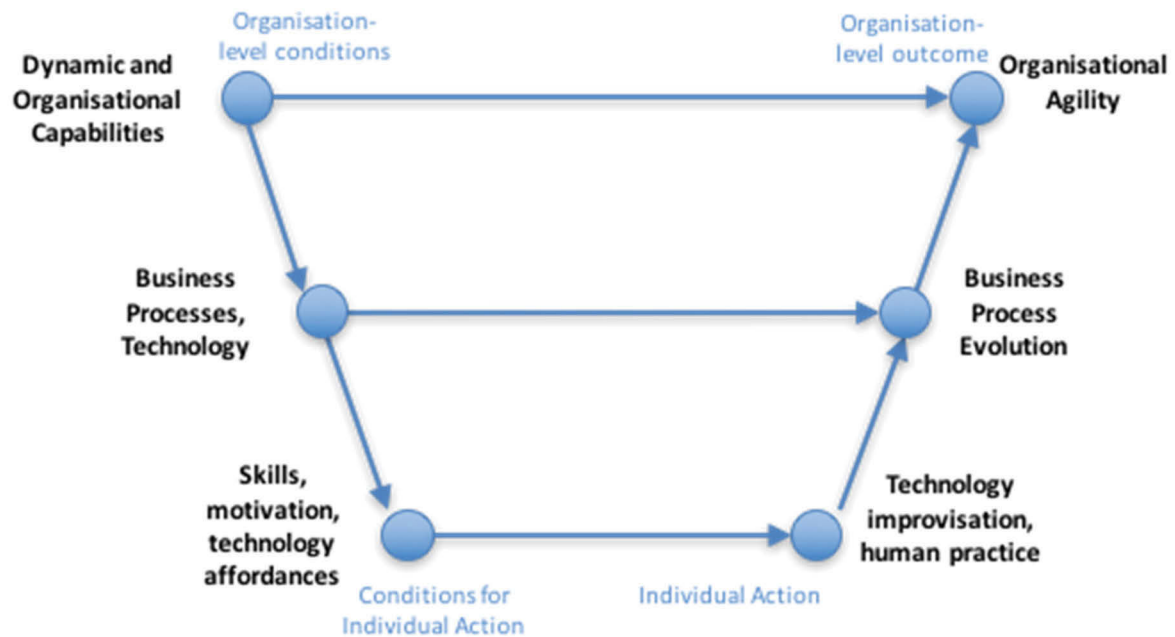


Figure 6 - Microfoundational levels of analysis

4.6 Summary

This chapter has built an initial conceptual model for the Framework that is:

- Underpinned by robust concepts. Drawn from extant research in management science, organisation science and information systems, these concepts have a solid theoretical basis and are supported by empirical studies.
- Frames the problem domain in terms of a novel multi-level microfoundational model that provides a conceptual bridge from the technology-in-use to outcomes at the organisational level. As something that defines what an organisation does to earn its living, organisational capability provides a link between the business imperatives of the organisation (i.e. which capabilities it needs to deploy to adapt to the pressure emanating from the business environment) to the work that is actually being done by the organisation (i.e. business processes and associated technology). As such it is a granular business alignment mechanism whereby the goals at the business process level can be aligned to the specific organisational capabilities they are enabling or delivering.
- Admits a system of systems perspective. The hierarchical view presented naturally allows treatment of these organisational components as a hierarchy of *systems*. Following this paradigm has a number of benefits. Firstly, that it is inherently a dynamic view, where there is a consequence for every action, rather than a static status quo. Secondly, it focusses on

emergence rather than reductionism. Even though the organisation is decomposed into a set of lower level building blocks, behaviours at a particular level emerge as a function of the components' inter-relationships rather than the individual components themselves.

- Supports the objectives of the research project. Finally, the use of socio-technical organisational building blocks provides the opportunity to understand business-IT alignment in a granular way, in terms of technology-in-use. The non-determinacy of human agency provides a source of flexibility (or rigidity) within the organisation (Feldman & Pentland 2003). This coupled with the intrinsically dynamic view of the organisation the Framework model represents, places the technology-in-use in the context of, and as a contributor to, the organisation's overall ability to respond in a timely manner to the need to adapt. This is central to the concept of agility.

5 Case Study One: A Large IT Services Provider

5.1 Preface to the Case Studies

In order to convey the research *process* as well as the research *outcomes*, the three case studies that comprise the empirical part of the research project are documented from the perspective of the point-in-time at which they occurred. This style of presentation shows the evolution of the concepts and how the Framework was refined over the course of the project, from one case study to the next.

The presentation of each case study follows the same basic structure, in three main sections:

1. **Case study Organisation.** The case study organisation and its current industry context is described. The specific research scope is defined in terms of lines of business represented and the associated organisational capabilities that were exemplified by these parts of the business.
2. **Data Analysis.** The initial analysis of the data obtained from the interviewing the participants¹⁰ is presented. In this section the empirical themes arising from second cycle coding (Miles et al. 2013) are provided along with sample evidentiary quotations.
3. **Theoretical Development.** A more detailed treatment of the empirical themes is provided with specific reference to the Framework. This section is the core of the build-evaluate approach that underpins this research project.

The first case study was treated as the pilot for the field work procedures and the analysis approach.

5.2 Case Study 1 - Organisation

5.2.1 Description

The case study organisation is a multi-national supplier of IT services to both public and private sector organisations. ABC¹¹ operates in over 70 countries around the world and has more than 80,000 staff. The firm was established in the US and has been in business since the 1950's. It is considered to be a tier one provider of a broad range of IT services, ranging from infrastructure outsourcing through to systems integration and consulting. The focus of the research was on the

¹⁰ The case study participation is summarised in

Table 8 - Number of interviews by management level

¹¹ A pseudonym.

Australian operating company, which conducts business across the APAC region. The local company retains some level of independence from the US parent, with the latter setting profitability targets to be achieved through an annual budgeting cycle, and the local company having some autonomy in setting business strategy to meet the targets. The local CEO is a level 2 report in the overall corporate structure. The Australian company is not listed on the ASX.

5.2.2 Context

According to Gartner (Lovelock et al. 2013), the global IT services industry was worth approximately one trillion US dollars in 2014 and is showing an annual growth rate of 5%. Emerging markets are dominated by China, India and other Asian countries, with the US, Western Europe (and Australia) seen as mature markets. Gartner research (Britz, Hale & Igou 2014) also suggests the IT services industry is in the midst of several transformative trends that move away from the traditional focus, on the part of an IT outsourcer, of efficiency and cost-reduction, to one of more directly enabling business outcomes for their customers. This is combined with an increasing expectation that new IT solutions can be rapidly deployed without the usual lengthy IT-procurement cycle. IT enablement via Cloud services is seen as the biggest transformative factor, that at once lends agility, but at the same time creates a need to overhaul traditional go-to-market strategies on the part of the service providers, such as, for example, moving to alternate pricing models (e.g. Cao, Ding & Su 2012; Li & Li 2013).

5.2.3 Organisational Capabilities

ABC provides a broad range of IT services, including:

- Infrastructure services. These include data centre operations, platform as a service (PaaS), software as a service (SaaS) and infrastructure as a service (IaaS). These are generally provided under extensive IT (out) sourcing contracts where a customer buys a range of commoditised services.
- Managed application services. Including the support, maintenance and enhancement of the customer's application portfolio.
- Systems Integration services. Design, development and deployment of new IT systems in response to the customer's business needs. This also includes package-based IT solutions and integration with the current application portfolio. ABC places emphasis on business rather than just technical solutions.

- Consulting services. This ranges from consulting to support other the services offerings to strategic business consultancy.

Within these broad capability areas, ABC has several niche “differentiator” capabilities, that include specific technologies and also to specific industries. Many of these differentiators are the result of partnerships with other technology vendors, where synergies have led to unique offerings. One example of this is ABC’s Secure Private Cloud service offering.

Research Scope

For the research project, two of ABC’s capability areas were chosen for investigation, namely, Managed Application Services and Consulting. The rationale for this choice is as follows:

- The two areas of capability form core service offerings for ABC and in themselves represent a significant part of ABC’s total business.
- Each therefore represent ABC’s competitive edge and therefore are implicated in ABC’s need for agility in responding to changing market forces in these areas of the business
- The two areas involve organisationally different areas of ABC reaching to the executive level. This represents an opportunity to explore two “businesses-within-the-business” to examine commonalities and differences at the capability level.

5.2.4 Business Processes

As with any large corporation, there are a large number of business processes that determine work practices within the company. At ABC, these processes are formalised to a varying degree and have a variable degree of automated support. Broadly there are two groups:

- Delivery Processes. Those processes that underpin the delivery of ABC’s capabilities (i.e. its service offerings) to its customers. These include sales processes, methodologies supporting the implementation of IT solutions and the associated delivery management processes. An important attribute of these delivery processes is that they are people-centric: in other words, the provision of IT services is largely a human activity supported by various technological tools. This contrasts with, for example, a manufacturing company in which the production of “widgets” has a large fully automated component.

These delivery processes are the primary focus of the research project, as they exist to support the competitive differentiator capabilities and hence have a significant bearing on organisational agility.

- Back-office Processes. Those processes supporting the running of ABC as a business, including human resource management, supply chain management, finance and administration, CIO's office and business excellence function. Being highly commoditised, and undifferentiated, these processes have less relevance to the research scope.

5.2.5 Use of Information Technology

Being an IT Services provider, ABC is a heavy user of IT to deliver services to its customers as well as to run its own business. Additionally, ABC has recently adopted a "customer zero" policy in which it becomes its own customer for new, chiefly infrastructure-based, service offerings, as a way of both ironing out potential deployment issues as well as testing the benefits they are claiming in the marketplace. This relates ABC's internal IT strategy to its external business strategy in an interesting way.

At a more basic level, a plethora of IT systems and tools exist to support the business. The intent in this section is to broadly characterise the IT usage within the organisation, a more detailed analysis is provided in section 5.3 *Data Analysis*.

With a focus on the service delivery processes in ABC, Table 11 provides a summary of the types of IT systems in use. Three categories are used to delineate the functional scope of the IT systems, as follows:

- Specific IT tools. This covers IT systems that have a specific set of designed functionality to support certain tasks. In these cases, the tools have been acquired to support a specific business process. Examples are, in the case of ABC, service request management, or supporting application software development.
- Generic IT tools. These represent tools with a wide range of functionality that are not designed to support a specific business process, but are applicable across a range of tasks and contexts. Examples are word processing, spreadsheets and drawing programs.
- Improvised tools. This category covers a range of home-grown, custom built, tools that have become de-facto standards within some organisational subgroup (e.g. geography or capability area). These have arisen typically to fill functional needs that are not addressed by the other categories, or at least that is the perception.

Table 11 - ABC company: Summary of IT systems supporting service delivery

Category of IT system	Examples	Business processes or work type supported	User Base*
Specific IT tools	Salesforce.com	Opportunity management	(O, OM)
	Remedy 7	Service request management	
	MKS Integrity	System lifecycle management	
	Sparx Enterprise Architect	System architecture modelling	
	HP Quality Centre	Software development	
	Java SDK		
Generic IT tools	MS Office	Documentation – formal and ad hoc	(E, OM, O)
	Lotus Notes	Data analysis tasks	
	Lotus Sametime	Presentations to customers	
	Jive	Knowledge management	
	Webex	Remote team working	
		Virtual communities	
Improvised Tools	Request management system	Delivery management	(OM, O)
	Resource planning system	Bid management	
	Estimation Model		
	Pricing Model		

*User base: (E) – Executive, (OM) – Operations Management, (O) – Operations staff

5.3 Data Analysis

This section presents the empirical results gleaned from the case study. The information gained from the interviews is summarised in terms of “themes” that represent commonalities across more than one interviewee. Illustrative quotations are provided to support the thematic idea. In this part of the analysis, the data is not being interpreted beyond the derivation of the thematic groupings.

Subsequently, in section 5.4, the empirical information from this section is interpreted in terms of the Framework conceptual model and the latter is further developed.

The themes emerging from the interviews are grouped into the following areas:

1. **Drivers for organisational agility.** The dynamics of ABC’s business environment and hence the drivers for ABC’s need to be agile.
2. **Speed to market.** This refers to the degree and speed with which the ABC can respond to the agility drivers, for example, to develop a new service offering.
3. **Market differentiation.** How ABC differentiates itself in terms of its capabilities in the market place.
4. **Standardisation of processes and systems.** ABC’s global organisational transformation program has been underway over the last couple of years aimed at gaining efficiencies by consolidating and standardising internal processes and systems.
5. **Innovation of services.** How ABC innovates new services.

6. **Service delivery processes.** The processes involved in delivering services to ABC's customers, within the Managed Application Services and Consulting organisational capabilities.
7. **Service delivery organisation.** The nature of the organisational unit within ABC that delivers services to ABC's customers.
8. **IT Support of business processes.** How technology is used to enable service delivery processes.
9. **IT Barriers.** Barriers or constraints on the usage of IT to support service delivery.

Drivers for Organisational Agility

- Technology innovation in the marketplace. The rapidly changing technology landscape creates challenges and opportunities for how ABC delivers its core value proposition.

"If we're across technology evolution and what's happening out there – how technology is changing and what new things are being invented and we combine that with what our client's pain points are and then start to devise solutions to address those. This can be used as knowledge to develop solutions, offerings that we can take out into the market. But if we're not good at doing either one of those we miss the boat and the opportunity." (Executive)

"We cannot continue to sell the products we used to sell. Creates new opportunities for us to sell different types of products and services. For example, years ago we offered simple data centre services that moved to various types of hosting and then to cloud services today. That technology innovation changes what our offering is and how we go to market." (Executive)

- Customer expectations for service providers are shifting based on technologies/service models available. ABC needs to respond this situation.

"A couple of years ago who would have thought a book seller would be a competitor of ours? You've got Amazon services being produced now through the Cloud, they're producing books and others things, but also IT services." (Executive)

"One of our largest competitors at the moment is in-sourcing, where a customer IT group thinks they can do what [ABC] does, as well and do

it cheaper. So, that is what they would say. My belief is that they truly do believe that, but also, that they're protecting turf. Because businesses are looking at the cost of IT, and one thing you do is get rid of the internal IT department. So, you have IT shops trying to prove their value and retain their staff. (Executive)

"Customer expectations have changed – what was accepted as good service years ago, would be unacceptable now. E.g. 20 years ago was normal to send a letter and not hear back for a few days, now I'll SMS someone and if I haven't got an answer in 30 seconds I'm sending a follow up. The client expectations about service, service levels and outage times are very different." (Executive)

- Nimble niche players are challenging the large traditional tier one players such as ABC.

"...over the last few years that we've been out paced by small nimble players. We're now having to compete against these companies that are now just as large just as substantial as we're, but they're offering these modern things and we're not there yet we're catching up" (Operations Management, MAS)

- Customer's own need for agility means they need to be able to change their IT mix rapidly, again implicating how providers such as ABC respond

"Customers drive what we do. Customers are experiencing their markets changing and therefore need to be able to spin on a dime. This flows through to what they require of [ABC's] solutions. Services we need provide - e.g. infrastructure scaling or application scaling." (Executive)

Speed to Market

- There is a degree of hype in the way ABC markets its capabilities when compared to the organisation's ability to deliver.

"There is a distinct lag between what we purport to offer to the marketplace and what we do for ourselves." (Operations Management, MAS)

“As we move to IT as a service, there is a gap between existing services, and the big picture that the CTO or others or customers would be looking at around fully virtualised cloud offerings.” (Executive)

“Now it's great for the thought leaders, those few stars as it were, to be able to promote all that stuff and articulate it some cases brilliantly. But, how is a middle level role supposed to be convinced about that when the systems they use internally within [ABC] don't measure up, don't even employ some of those technologies” (Operations Management, MAS)

- Organisational structures are not consistent with delivery of required capabilities. The organisation is too invested in traditional approaches.

“A great example that would be Cloud, where we talked about it for ages, we did do some things but they were very timid movements and they were rooted in my mind in our traditional legacy world. So we talked about things like virtualisation and moving infrastructure to the Cloud and the initial efforts were little more than a new way of pricing the same thing for the customer.” (Operations Management, MAS)

“I do believe that [changing the] mindset plays a big part, and to be able to be an agile learner will be the difference. How people can shift and adopt and change quickly is a differentiator [between] them and people who can't. But you need to create an environment where that is expected behaviour, and I think we're getting there but I think it's very slow. When I say very slow, I shouldn't say that, in 2 years to try and create a massive cultural change. There has been so much change in the 2 years it's just unbelievable” (Executive)

“We've seen a lack of managerial courage because, with being on the bleeding edge and having an agile front end of your business, comes managerial courage. So, someone within [ABC] in the finance department will say you can't move this to Amazon because I'm still sweating the asset. Because it was purchased in 2004 and yes it's fully

depreciated, but I can get another three years out of it before I need to spend any money.” (Operations Management, Consulting)

- Following a trend in the marketplace, ABC is moving to from a situation where its service offerings are fragmented and poorly aligned to strategy, to a reduced set of standardised offerings that can be deployed more effectively.

“[ABC] is moving from 2000 ‘flavours’ of solution offering (e.g. Virtual desktop) which is not agile to a much reduced number of standard offerings.” (Executive)

“[the drivers were] two things efficiency and effectiveness. Efficiency is very important but effectiveness has got to be part of that. Standardisation is the way in which you get large benefits in any organisation.” (Executive)

“Where application services wants to head is towards a higher degree of industrialisation of offerings. And the terminology that's been used in the last couple of years is "Factory" or software factory” (Operations Management, MAS)

“But the act of creating or producing that commoditised service, product or offering could actually be quite creative and very rewarding. But if it's just about teaching the factory workers, the application support staff, how to crank the handle more efficiently in a mechanical way, then I can't see how that is going to be very rewarding.” (Operations Management, MAS)

Market Differentiation

- There is a move in the marketplace towards a utility pricing model, where customers “pay by the drink” for the types of services ABC offers.

“Our pricing model and our predictability of costs from our managed service is quite impressive when you tell the story of how we set that up. Application support is generally seen as pretty boring but it's fairly high cost as well so customers are interested making sure it's a

reasonable cost, but also price predictability. Utility pricing - flexibility around that” (Executive)

“We're now pricing services per application, based on their complexity, which is based on things like number of instances, number of interfaces, technology and so forth. Customers have the ability with that to say I'm going to switch that application off, I don't want that supported any more, and we'll adjust the price, downwards in that case. Or I want to add a few applications, and we adjust the price up” (Executive)

- ABC has domain expertise in both specific industries and technologies, this is seen as a key differentiator when creating a value proposition for a client.

“Our expertise around a lot of the applications in particular domains like mining. Our expertise in particular applications can be replicated to other clients so we've got domain expertise. I think domain expertise is becoming more important as businesses are owning IT more” (Executive)

“So we've got a bunch of more specific consulting competencies and they really are the differentiators ...we have a whole lot of people with more in-depth technical knowledge. Not as fungible. Consulting firms talk about fungibility of staff the ability to move them for one project to another. They just adapt and then very quickly and can do a variety of things ... Our guys are much more narrow and specific. But because we got the size of the organisation we can afford to do that.” (Executive)

Standardisation of processes and systems

- Back office processes are being consolidated and standardised to achieve efficiencies and cost reduction. This has also given rise tensions as the local operating company comes to terms with a “one size fits all” approach.

“So it is now that model that we have attempted to rollout across the other application services regions. It's partial because the Europe regions were more than half way there and were happy to embrace it

because it aligned with their thinking. India was quite happy to take it on because they had nothing else.” (Operations Management, MAS)

“We've been forced into a global model where you're meant to use [a request system to contact the desktop support group in India], you can either call them up or you send them an e-mail. They'll either come back with an immediate e-mail response or they'll say someone will contact you. The e-mail response is typically written in "Jinglish" and I don't understand it. And so, you have to talk to someone, and because I've talk to the guys over there before I keep saving their names in my Sametime list. So, I'm contacting them directly, which they may or may not be happy with (laughs) so despite the processes that are in place, I will go around them to get something done quickly.” (Operations, Consulting)

“The problem that the rest of the globe had was they did a truckload of deployments, some very intensive deployments, but then they couldn't sustain it because the compliance checking routines were very very labour intensive. So, it felt by the wayside...whereas we had, somewhat against the conventional orthodoxy, adopted a much laxer regime in their terms. But our argument was always that this is more practical, more sustainable.” (Operations Management, MAS)

- The centralisation of organisational functions has also led to a loss of control for the local operations in running their business.

“I think that over time it will become more flexible than it currently is. The requirements over the last couple of years is for the controls to be taken back at central, and that was because really the regions were running a little amok. And they didn't know what was happening in the majority of regions. So, they took all control back to the central point, and they had let a little bit out. But over time, once they feel we have embraced this global entity, and we have the processes and systems in place to support a global entity, there will be more opportunity that will come back to regions” (Executive)

“We have to adhere to weekly cyclical process otherwise we're non-compliant with our reporting overseas” (Operations Management, Consulting)

“We need to be able to secure and treat data according to local requirements (e.g. On or off-shoring government requirements). This is a major issue that needs to be carefully considered. Also, US requires some systems to be onshore. This is a potential roadblock to using the public cloud. Tools being developed to circumvent this and provide security. Expect gradual adoption. We're a leader in this regard” (Executive)

“The [global] CEO wanted to see where everyone sat but that was nothing available to give that information. All the HR systems being used by all the different operating groups were all disparate and so there was no single consolidated picture. So, he got [a consulting firm] to write a dirty great big spreadsheet system. Called the GPT or the global position tool” (Operations Management, Consulting)

- In the drive for increased efficiencies and reduction in overhead costs, the local operational management is bearing the brunt of the impact.

“Our competitors are putting pressure on [ABC] margins, and we don't have a low overhead structure so that tends to make us quite expensive in the marketplace. Or can do. We're currently going through various activities looking at rates, and overheads, salaries etc.” (Executive)

“There's nothing enjoyable about being fodder, grist for the low-cost IT labour mill, being told to blindly follow some dumb instruction to do something. [That] was a very US-centric attitude and it was some years ago, where they needed to solve some problem that could have been solved, say, programmatically or through a system or through whatever, some device or technology, and literally the Americans said to us, no we've done our sums and the cheapest way will be to assign a bunch of Indians and have them re-enter the data and they did that, rather than solve the problem a different way. So, I believe that is

simply dumb business, never mind the moral and ethical dimension. That is not a strategy of a winning organisation.” (Operations Management, MAS)

“So if you ask about BYOD [Bring Your Own Device], it is yet another not so subtle means to shift cost from the employer to the employee. So, there's all sorts of ways that we've done that, right, self-service has done that, a cheaper location is doing that, people working from home, shared and limited constrained facilities are always at doing that. So, the concern is that BYOD will be used the same way rather than a way of actually giving people tools [as an enabler]” (Operations Management, MAS)

- Following the standardisation of business processes, the supporting IT systems are also being rationalised. However, this has again caused local versus global tensions.

“As an enterprise you want to be using ‘consumer grade’ rather than enterprise apps since they are built to support thousands or millions of users. The downside is vanilla functionality.” (Executive)

“I've never seen [the standardisation of IT systems] happen because you're fighting against the needs of 60 countries.” (Operations Management, Consulting)

“Home-grown applications or tools are not robust in how they've been conceived. So, that means they simply can't be translated somewhere else. Other times even though the tool itself maybe robust, the transfer of the conceptual knowledge and understanding of the tool and why that tool supports your process is imperfect and so because the transfer of the conceptual information is poor the receiver feels compelled to change the tool. Because they think tool doesn't work.” (Operations Management, MAS)

“The idea is to have all the tools globalised which is supposed to cut license costs. The only issue I see is that the decision on these tools is taking so long to implement that teams in the regions just don't have time to wait, so they just implement their own. So, the action seems

quite logical and I like it, but it is slow.” (Operations Management, MAS)

- Trend towards self-service processes creates an impost on professional staff who perceive it as another bureaucratic layer and are motivated to find work-arounds.

“I have two outstanding expense reports for trips that I haven't done yet, and I'm going to be charged a fortune for not having them done [in the expense system]. So, it's time consuming, it's not complex, somebody would have to do it, but at the moment they've got me doing it. Which, I know what I did, so it makes sense for me to do it. But it still takes me time, and there's no time in the working day to do it. (Operations, Consulting)

“The system starts the [travel booking] process, then I ring them up because I can't book the hotel because it says it's not available, and then they do that for me” (Operations, Consulting)

“The [travel] booking process, I know how to get around: I ignore all warnings they give me about the fact that I'm doing things against policy. I'm not going to fly at that time I want to fly at this time. So, the system is not preventing me I just know how to get around it to get what I want.” (Operations, Consulting)

“In some cases there are genuinely different requirements [between geographies]. But even where there aren't genuinely different requirements, even where they're trying to satisfy the same requirements, it doesn't seem to happen. I think there are a number of reasons for it, one is a quite simple "not invented here". I didn't make it and therefore I don't want it and I don't understand it” (Operations Management, MAS)

Innovation of Services

- There is an increased use of partnerships with niche vendors to innovate new offerings based on capability synergies.

“With partners like [a Telco] who spends millions on network and communications type environments, that'll give us an advantage to utilise that investment they've put in there to bring to our clients solutions that we wouldn't have been able to do ourselves” (Executive)

“None of our competitors are doing anywhere near that alliance and partnering that we have been able to achieve in a very short time.” (Executive)

“I think [ABC's transformation strategy] has created not only a focus on those emerging technologies, but also on partnering and alliances to help us gain the capabilities and research that other organisations have done, so we don't have to invest in them ourselves.” (Executive)

- Information technology is now itself an enabler of innovation.

“The paradigm as changed – which is why we've gone down the path of investing so heavily in Cloud as this is an agile enabler. It's not something that requires a huge up-front investment only to find that 5 years down the track it was not seen as useful and therefore a bad investment because we have no flexibility to deviate from it.” (Executive)

“[Installation of] Salesforce is a response to our business transformation strategy to become a more sales focussed organisation. We were very back office heavy and light up front. Now changed to be quite robust up front. We now need a platform that can respond to change at front of shop” (Executive)

“The idea with services going forward is we need to start building knowledge basis, and start to use the intelligence that comes from supporting applications. To actually become more proactive in maintaining and supporting the applications” (Executive)

Service Delivery Processes

- For operational staff, process compliance is traded off against achieving what is perceived to be the “right” business outcome.

“It's understanding what you're really trying to achieve, what the real objectives are so that the work that's done to meet the process steps are done to the appropriate level, within an appropriate timeframe and it's not trying to be squeezed. Because all that happens is, the sales process says, okay you've got three days to do this, three days to do that review, three days to do this other review, and if you've got a 4-week bid timeframe then you've taken up two weeks of that with reviews. It's just ridiculous. So, that has to be an appropriate level of timing, and in appropriate level of agreed outputs appropriate level of detail, and appropriate level of variance.” (Operations, Consulting)

“We're placing quite a large administrative burden on the Project manager, so we haven't actually made their job easier, we've made it more difficult. It's more compliant, but does it deliver a better outcome for the organisation? I'm not sure, ...but does it increase the burden on the role, in my view I've seen enough of it to perceive that that is the case.” (Operations Management, MAS)

“It feels like better education about the objectives would enable everybody to focus on the right things throughout that very fluid activity. Because sometimes you say why am I going to this meeting, I don't understand the objectives here.” (Operations, Consulting)

“When we do [Applications] support services we're actually using the same processes for service management, the same disciplines, the same tools, the same constraints [as ABC's infrastructure services business]. But to a greater degree we're reliant on the individuals whereas the infrastructure guys are less reliant on the individuals” (Operations Management, MAS)

- ABC's organisational transformation is following a model of Incremental process improvement than radical innovation of a new business model.

“[moving to a different model of support] may require radically different processes. And I don't believe we've figured that out yet. So, what's has been assumed has been an incremental improvement of the

existing processes, not a radical new approach to how you do work. By taking up the existing legacy best practice, that's how they're going to drive the new industrialised factory.” (Operations Management, MAS)

“Things do evolve, so no matter how revolutionary we might characterise the likes of Apple, and they are an incredibly creative company, but the iPad and iPhone didn't spring fully formed out of nowhere. They were built on the things that were already there, almost every element was already there.” (Operations Management, MAS)

“So the question is, is [ABC] open to [radical process innovation] or are they protecting a legacy. So, for example the last company I work for had an objective that every two years 30% of its revenue would be from new offerings and things it is not done before.” (Executive)

“Sometimes you can keep evolving processes, so [for example] that might be a smart way of doing project management. We can keep updating our Prince qualifications and people can go through training and things like that and you can do incremental change.” (Executive)

- Some business processes are perceived to be overly complex.

“There is more than enough complexity and we keep inventing more. I find it very complex for example all of these reviews we have for submitting bids.” (Executive)

“I have a level of confusion because there're so many lines of service involved as to who I have to keep informed, and who has to sign things off. And it's not my responsibility to do that, but you do need to keep them online, and involved. And maybe it's different because you've got India and global and multiple lines of service in Australia as well involved in this and so there is no one person I can go to and say can you approve this all.” (Operations Management, Consulting)

- Even though the service delivery processes are well defined, there is a requirement for flexibility in how they are executed.

"I think absolutely that [the sales process] is fluid, and things change all the time whether it be the way the customer wants the process run or the way the groups are engaged to be part of the process. You do have to have structure so that you get things signed etc., but it is such a fluid process, people have to be proactive and reactive you have to have all the right players listening to you and all that." (Operations, Consulting)

"I guess it's the main structure of how support is handled, then in terms of flexibility we have things like squad plans where you group to or more members in a team together to work on a particular task. They may have varying skills within team which could tackle a particular project. And then those interventions are managed week by week based on the work that's required. I guess there's a structure and there's flexibility on the 'how'." (Operations, MAS)

"No [it's not like a mechanical process], you know how you have your standard workflow in case management, you have your case workers who are just intelligent, they know what has to be done when, they say okay we do this now. It's got to be run by a caseworker, but it's not a step-by-step process. There are some gates as I said, but they can be fluid as well, you know things change constantly." (Operations, Consulting)

- Capturing and being able to transfer the knowledge of staff is understood to be important part of ABC's operations.

"You need to have some sort of knowledge management in a consultancy." (Executive)

"So there are a couple of ways [we do KM]. One is the support team is explicitly document some of these things, and some of the good teams, some of the well-run teams are actually good at doing this. Obviously, some teams to fall by the wayside terms of documenting knowledge that ought to be shared." (Operations Management, MAS)

*“The other way in which it happens would typically be part of a knowledge transfer process. Either because work is transitioning from another provider to [ABC], or it’s transitioning from development to support, or it’s transitioning from one location to another”.
(Operations Management, MAS)*

“The idea with services going forward is we need to start building knowledge basis, and start to use the intelligence that comes from supporting applications. To actually become more proactive in maintaining and supporting the applications. So, they are the tools, but apart from that, we use the service management tools.” (Executive)

“We write documentation on [the Confluence and Alfresco systems]. If someone is doing an enhancement and comes across a problem and its happened before, we tend to document that. So, that also eliminates our issues if we have only one or two people on support and suddenly they're on leave, and other people are unaware of certain production problems or things like that, we do have all that documented [Confluence] so that way other people can just go in and say yeah that's happened before, this is how you fix it, or to understand the current state of our systems.” (Operations, MAS)

Service Delivery Organisation

- The globalised resource allocation model that ABC is moving to is premised on the ability to “commoditise” staff in terms of standard roles and competencies. There is a tension between the objectives of such a model and actual practice: e.g. geographic mobility required, individual skills and knowledge.

“The organisation does have the expectation to be able to [have a commoditised workforce]. But if they take that Factory concept to its logical conclusion, it shouldn't matter, because what the customer buys is not connected directly to a team. So therefore, we should be able to organise it however the hell we like. But in our present state that's not true, because the customer does have visibility of the teams, they do look and say Joe is the team leader and therefore [I want Joe assigned]” (Operations Management, MAS)

“We have a whole lot of people with more in-depth technical knowledge. Not as fungible. Consulting firms talk about fungibility of staff - the ability to move them for one project to another. They just adapt and then very quickly and can do a variety of things.” (Executive)

“I've also seen some people move across role, say from being a dispatcher to being a project manager, or perhaps some sort of account management assignment. I've seen business analyst or some other technical role or architect role move to something different like to be a dispatcher or a project manager. It can be successful, but on average I'd say it's less because it's a bigger leap.” (Operations Management, MAS)

“The fact that we're part of a global company there is the benefit of being able to draw on that and then build up the expertise locally. That is one of the draw cards on this particular bid that I'm working on, we've got this global expertise that we can bring to bear. Then from our internal perspective, getting as many people across that particular industry while these global experts are there is a really good idea. I'm not sure we're taking enough advantage of that but nevertheless that is an idea that we should be able to build up a local expertise with on-the-job training as it were.” (Operations, Consulting)

- Highly matrixed organisational structure creates complexity in operational working relationships.

“I have a line manager that looks after me from an HR perspective, but the rest of it is fairly flexible from the reporting lines. I could be reporting directly into an industry, or into an account team, if I'm doing something for a particular client. So whenever there's trouble you go directly down your line reporting, if you need advice. But typically day to day you would report into whoever is getting you to do that piece of work. And that could be anybody. So, the structure doesn't flex so much as individuals within it to maintain day-to-day work.” (Operations, Consulting)

“We're going through a reorganisation, but the theory is that you had a team that you work within and they're just colleagues, so they're not necessarily the people you would do a project with, they are colleagues that you can liaise with. So, you have a manager that you report to and you also have matrix managers in the industries (verticals), and then of course you have the sales relationship that we have too. So, you had a team that you sit in, but you don't necessarily work with them. So, then you have other people who get you to do work so you report to them in that regard for ad hoc consulting assignments within particular industries, or bid responses within the sales function.” (Operations, Consulting)

IT Support of Processes

- Operations staff largely “make do” with the provided corporate IT systems and tools.

“[those service management toolsets cover 99% of what you need?] Yes.” (Operations, MAS)

“Because you're doing it so quickly, you really have to come onto a job with what you've got, and work with it. As long as I've got my connectivity back to the office, connectivity for Internet and my telephone that's really enough. And my [MS] Word products and all those things I'm happy.” (Operations, Consulting)

“I would go to Visio for the basic graphics they've got in there. If it's a more conceptual view, then I would use PowerPoint. Depends on how complex I want the picture to be” (Operations, Consulting)

“Yes absolutely [I turn to Excel first]. And the main reason I do that is that's where you start, that becomes the source information. You can put a lot more information in there, and you can manipulate it much easier. It's a working tool rather than necessarily a presentation tool. (Operations, Consulting)

“Whenever I have a table and I want to look at comparisons, I want to filter, if I have a whole lot of information that I want to filter easily I will use Excel to do that.” (Operations, Consulting)

- Technology tools are improvised to fill gaps in functionality or poor corporate systems

“Because they're application support teams, they have the skills to build tools themselves. In some cases, they've built tools, they've use the technologies at their disposal and they built their own web-based or their own application systems that actually mimic the process or satisfy the intent and the outcome of the process. In some cases, they use spreadsheets, so they use a fairly clunky level of digitisation, but if it's effective then there's nothing wrong with that” (Operations Management, MAS)

“We will improvise, we'll do what we need to do, we've got a business to run. We can't say well I didn't have the tools I can't do my job. That doesn't carry as an excuse to well. So, depending on what tools we've got will leverage them but that will impact our productivity and output and so on.” (Executive)

“Classic example, we built our own system that manages resourcing across consulting. We've slowly built that out over a number of years. That started when we previously trialled Novient in Australia. Literally you could press the key and if you go over half a day before anything came back. It was an abysmal rollout. They took it to a point here in Australia where we hired data entry clerks because people weren't waiting around to enter data. So, they eventually got rid of Novient.” (Operations Management, Consulting)

IT Barriers

- For some operational business processes, the current level of technology enablement is perceived to be inadequate.

“We use the agile methodology for projects and we don't have any tools to support that. Also for bug tracking for projects we don't have any tools like Jira or something like that. I know I've made requests in the past for projects. Especially when there's a push to be agile I've recommended several agile applications and they haven't been approved.” (Operations, MAS)

"It's like as soon as something becomes hard, or slow, you go back to local, quick, immediate and just send an e-mail off. And that is what I think is the biggest problem with collaboration, because collaboration needs to be fast and efficient. If it's not, then it won't be used. Because people are in such a rush." (Operations, Consulting)

"So when you're doing work with a lot of files and documents there has to be some generic way of sorting them because everyone's logic is different. So, you have to have tags on them or something so that you can find the information, and what I found with these [corporate] tools is that mostly it's useless." (Operations, Consulting)

"[Confluence is] pretty much a knowledge database. That's a shortfall of our work request system. If we had Remedy [in this account], which I think we're migrating to, that would have an incident management system and you could create problem tickets based on that so you could say I got this problem this is related to this fix or workaround. It's a far more centralised tool to handle all of that, but our work request system doesn't do that at the moment and we got a lot of our documentation on [Confluence]." (Operations, MAS)

"[Knowledge Management] can play a massive role. But it depends on how good the systems you've got are." (Executive)

"So it's not just a technology tool, it's how it used." (Executive)

"I see latency as an issue, as we have more and more North American hosted solutions. Tool runs like a dog." (Executive)

- There are gaps in the technology supporting remote operations.

"Because I travel a lot, I do carry my laptop with me, but it's very heavy, so that's the problem. And all of the bits and pieces that go with it, the battery doesn't last long enough, so you have to carry the cables, you can't just leave them in your bag. If you want to use it while travelling, you know, on the flight." (Operations, Consulting)

"If I had the ability to use my iPad more it would be great. I can use it for a few things, but not for everything... And then there's my mail I'm not getting access to it easily. I liked my Blackberry because I could see my mail and my Sametime and all that and I don't have that same capability on my iPhone." (Operations, Consulting)

"The main problem with access for support teams is telecommunications, the lack of Optus [the corporate telco provider] coverage in regions in many locations tends to drive you towards Telstra. The company has been trying to restrict the number of air cards. So, that's actually been the biggest issue that we've had to deal with in terms of ability to support customers." (Executive)

- Regardless of their functionality, some IT systems were poorly deployed, leading to usage problems.

"I don't think [the internal IT organisation] add any particular innovative value to the organisation. At some stage, rather we'll probably be a Microsoft stack. Generally, from a value-added perspective, they don't add much value apart from keeping the existing systems going, most of the time." (Executive)

"if nobody uses it if you can put all the tools you want there and it just doesn't matter." (Executive)

"The way we deployed [Salesforce.com] and the way we set up the business rules - we're really proud we had adopted the marketplaces leading solution, but we did it so badly that the data in it is unusable." (Operations Management, Consulting)

"They do give you some training but it's pretty basic, it's just all the stuff you can actually see on the screen. But when you're looking for something a little different, and it's not intuitive, you have to go through your thought process, what did I do last time, I can't remember, there was a button somewhere but where is it? Because it's not intuitive, even if they give you some training, it's a process step a

little thing you might do rarely, you forget so it should be intuitive.
(Operations, Consulting)

*"We need a proper virtual workplace. People just want stuff to work.
Don't want to do a 1-hour tutorial to learn how to use."* (Executive)

*"I don't think training exists, everything is self-learned. So, you jump
on and you have to work it out."* (Executive)

- Poor communication of IT strategy from CIO's office to business stakeholders.

*"I don't know [about the IT strategy]. I keep hearing we're getting
Microsoft Exchange, we're getting this and the other."* (Executive)

*"I only [have contact with CIO's office] when we see something that we
want to have access to."* (Operations Management, Consulting)

5.4 Theoretical Development

The purpose of this section is to analyse the preceding empirical data against the theoretical Framework that is being developed as the outcome of the research project. The intent is to:

- Assess the adequacy of the Framework's conceptual model in the light of the empirical data.
- Develop new constructs to support the elucidation of the Research Question, namely to:
 - improve the Framework's ability to model of the case study organisation at an adequate level of granularity, and
 - model relationships between concepts so as to develop an understanding of the links between the organisation's usage of IT and the organisation's agility in its marketplace.

In chapter 4 *Initial Theoretical Development* an initial conceptual model was developed for the Framework. In summary, the model contains these essential elements:

- Organisational building blocks comprising organisational capabilities, business processes, human actors, technologies and technology affordances
- An extra-organisational view depicting capabilities co-evolving across competing organisations

- An intra-organisational view depicting the *alignment* between the organisational capabilities required (as determined exogenously), with those business processes the organisation can deploy to enable the delivery of those capabilities.
- A conceptualisation of business process that recognises a distinction between the process as defined and the process as practiced.
- A socio-technical perspective that emphasises the outcomes of technology usage are *emergent* from the human actor's relationship with the technology artefact.

5.4.1 Mapping of Themes to Framework Conceptual Model

Figure 7 below summarises how the themes developed from the empirical data. Table 12 describes the mapping in more detail (the entries in Table 12 correspond to the numbered labels in Figure 7).

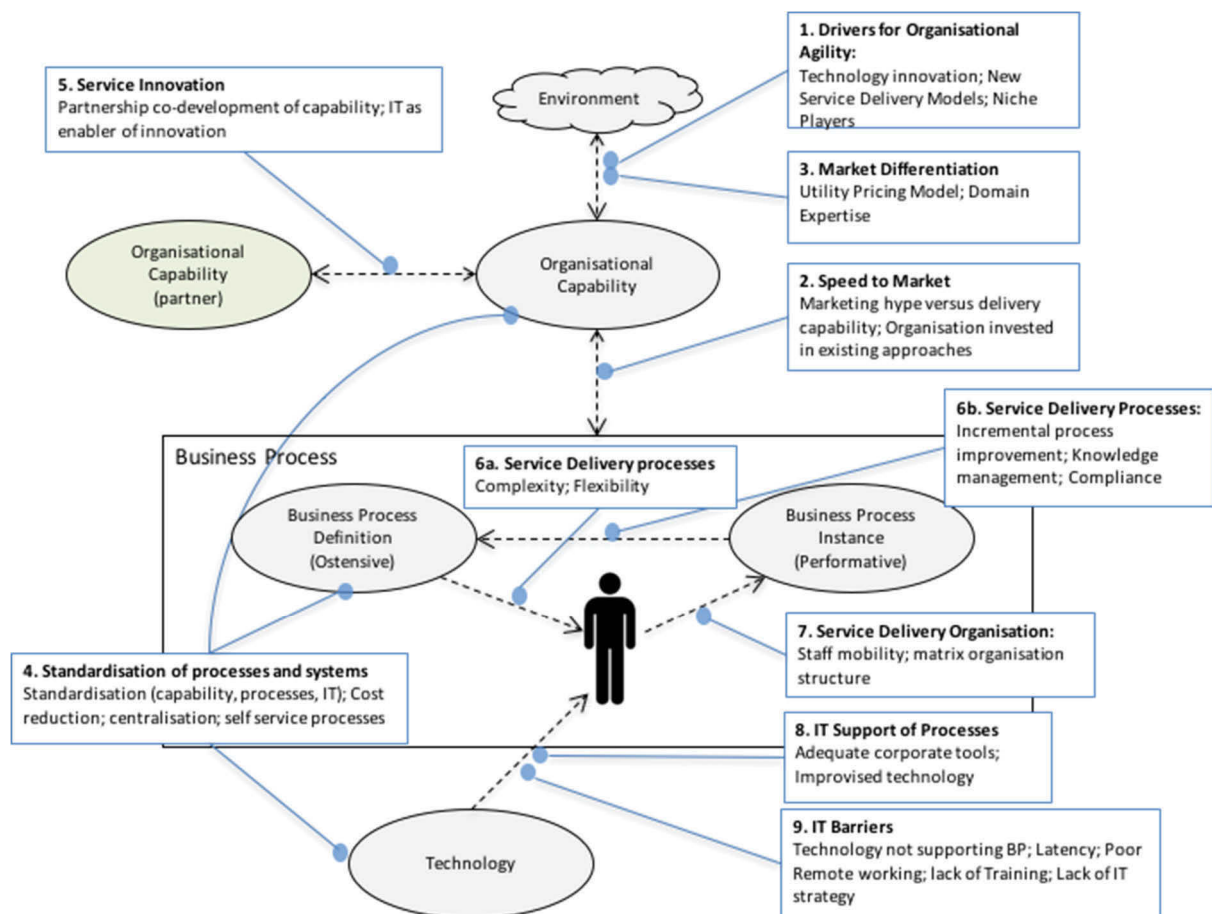


Figure 7 – ABC: Empirical data themes mapped to Framework conceptual model

Table 12 – ABC: Mapping of empirical data themes to Framework

Theme Group	Theme Mapping	Observations in terms of the Framework
1. Drivers for Organisational Agility	The IT services marketplace is driving ABC's need for agility, the empirical data shows three pressures requiring ABC to develop and deploy new capability. In summary, these are technological innovation, new service delivery models and the rise of niche players.	This link in the Framework ties the (current) organisational capabilities being deployed by the organisation, to the selective pressures in the business environment that determine the relevancy and therefore the value proposition represented by those capabilities. Thus, the question prompted is: Given these environmental pressures, what new or changed capabilities do we need to deploy to be successful?
2. Speed to Market	The evidence was that the marketing division was quick to identify the need and even to craft new service offerings, but as far as the delivery organisation was concerned this was hype and ignored the significant organisational inertia that exists in being able to change to deliver the new offerings.	This Framework link is key to understanding the dynamic between externally derived competitive pressures and the organisation's ability to mobilise its resources (business processes, technology and staff) and deliver them. The Framework models this as the intersection of two fitness landscapes. The technical fitness (TF) of a capability reflects the ability of the organisation to deploy the capability in a cost-effective way, whereas the evolutionary fitness (EF) reflects market demand and therefore is a measure of whether you will be effective in selling it. The effect of the organisational inertia demonstrated by ABC can be modelled in terms of EF being "out of sync" with TF of a given capability. In other words, if, in response to a change in the exogenous (market) demand for a capability, there is a lag before TF is achieved, then the demand could have since diminished and thus the EF may never be attained. The questions prompted at this level are: What is the volatility in the marketplace? Given we need to deploy this new capability to compete, what are the internal requirements on the organisation to mobilise or change the existing resource base? How long will it take?
3. Market Differentiation	The business environment is driving change in ABC's capability "profile". For the Managed Application Services area, the development of "smart" (e.g. utility) pricing models was one response to a market that is moving towards a more commoditised approach to buying IT services.	ABC is market <i>driven</i> rather than market <i>driving</i> . This is evidenced by responses such as this by management. This mapping asks: What is the competitive edge represented by our response (to develop and deploy new capability X)? This is part of developing the value proposition for a new capability. More generally, through the lens of an evolutionary paradigm, one could view this as <i>deliberate variation</i> (Volberda & Lewin 2003) in which only "valid" new capabilities are considered.

4. Standardisation of processes and IT systems	This standardisation theme reflects ABC pursuing exploitation rather than exploration (Benner & Tushman 2003) as a transformation strategy. The theme goes across the capability, process and technology components of the model, creating ripple-on effects. An example is ABC is standardising its resource planning and allocation into a global tool. Since Australia has local conditions around, pay, leave and other conditions, the local effect is the increased use of improvised spreadsheet-based systems to work-around the “vanilla” functionality.	The Framework model prompts a questioning of the <i>relationships</i> between the entities that are being standardised (i.e. the processes or technologies). Thus, if we standardise IT for example, which processes are implicated. If we rationalise our (deployed) capabilities to a specified subset, which business processes are now impacted, in turn how does this affect the enablement of those processes by IT systems. The motivation of staff to work around perceived shortfalls in IT system functionality leading to improvised solutions, invokes the imbrication concept (Leonardi 2011). There is an adaptive relationship in evidence between user and technology such that the constraints and affordances in the latter, perceived by the user, give rise to improvisations that “adapt” the technology to the problem at hand. Further, these improvisations in some cases take hold and become business-as-usual.
5. Service Innovation	ABC expressed the value of innovation with partner organisations or acquisitions, where essentially new capabilities are formed from the synergies between the existing capabilities in each firm. An example in ABC’s case is partnering with Cloud infrastructure companies, such as Amazon, to create a higher order offering of a “Secure Business Cloud”.	The Framework conceptualises this as part of the inter-organisational co-evolutionary relationships that exists at the organisational capability level. The partner organisation capability has been shown in Figure 7 in order to represent this relationship. A question that could be prompted here is “Given our capabilities and those of competitors/partners, what are the opportunities for value co-creation based on capability synergies?”
6a. Service Delivery Processes	There are two areas where the themes relating to ABC’s service delivery processes map to the Framework. The first (6a), deals with the nature of the business processes as perceived by the actors who participate in them: their complexity and flexibility.	This link relates to how the Framework conceptualises the process as <i>perceived</i> by the human actors at the point of use. In order to enact an ostensible business process, there is an interpretation step on the part of the actor which is a function of the actor’s background and point of view. One can also regard the ostensive business process as the realisation of top-down management intent to orchestrate the organisation’s resources to realise a certain capability. Thus, the challenge is to ensure the business process is designed and the actors are selected such that this interpretation step leads to the desired outcomes. Thus, not only do the purpose and expectations need to be communicated (e.g. by management) but also the motivation and skills of the actors recognised as a factor.
6b. Service Delivery Processes	In ABC’s case, there are several mechanisms for (6b) in evidence: there is active process improvement activity, there is knowledge management and there is knowledge transfer which all involve the creation of explicit process knowledge artefacts informed by practice.	This link concerns how the organisation learns from the business processes as <i>practised</i> . This is intrinsic to why a series of activities can be called a <i>process</i> : i.e. as something that is repeatable. This repeatability is dependent on some shared view of the process being retained, which in turn implies this feedback loop from performative to the ostensive aspects
7. Service Delivery Organisation	For ABC, the mobility of their staff across different projects or locations that use the same ostensive process is important. This	The Framework places the human actors in the role of taking action (through link 7) based on their interpretation of the business process (see 6) and the use of any

	objective consists of two parts: firstly, the standardisation of process (see 6) and secondly the necessary skill and competencies on the part of the human actors.	supporting technology (8 and 9). As discussed under (6) their “worldview” including motivation and context informs how they perceive the process; their skills and competencies will inform the performative part. Noteworthy here is that the Framework does not represent organisational structures beyond this simple process-actor model. In other words, the Framework is based around the <i>process</i> as the fundamental organisational building block rather than other management structures
8. IT Support of Business Processes	As in any modern organisation, IT plays an important role in supporting ABC’s business processes. For ABC’s Managed Applications Services business, the IT tools being used were more closely aligned to directly supporting the business processes. This contrasts with the Consulting business which is less process-driven and tended to require the flexibility of the more generic IT tools. Collaboration tools were seen as a big enabler by both business areas. Improvisation of local solutions to work around variations in business processes, or limitations in other systems was a major finding. In these cases, tools already available (such as Excel or programming environments) are used as the basis of new business systems.	The Framework conceptualises IT support of business process in terms of technology affordances (Zammuto et al. 2007) that are available to the human actor. As such there is no direct relationship between the technology and the business process except via the actor. The actor contextualises the process and the technology in this model, at the point at which they are used. The improvisation of new IT systems, as found in the case study, relates to this affordance perspective. IT user’s perceptions about the gap between their desired action and the IT system’s capability to support it, leads to improvisation either in building new tools or implementing some work-around in the process. This aligns with the idea that the way humans and technology are imbricated provides flexibility in the process (Leonardi 2011).
9. IT Barriers	Several shortcomings or limitations to the way IT supports the business were pointed out across all organisational levels. These issues were less about gaps in process enablement but related more to operational problems with existing IT. Two overall trends appear. Firstly, the centralisation of IT systems (as part of a strategy of standardisation) has meant a move to offshore hosting, in turn leading to latency problems. Secondly, the increase in the mobility of the workforce has had the effect of more remote working, with a new range of issues around portability of devices, access to networks and software. Some of these have prompted improvisation of workable local solutions.	In the framework, these IT barriers operate at the technology affordance level since they affect the perception of the alignment of the IT systems with the goal or intended action of the IT user. So, for example, if the user perceives an unacceptable response time from an IT system they will be motivated to adapt to the situation. In the short term this could mean a process-level workaround, in the longer term it could mean improvisation of a new local system to replace the functionality. Both were evident at ABC.

5.4.2 Assessment of the Conceptual Model

The case study research methodology being employed is one of iterative development and refinement of the Framework conceptual model and constructs. This section reviews the current state of the Framework conceptual model in the light of the empirical data from this case study and in particular the mapping presented in the preceding section.

Firstly, a limitation is that Framework is deliberately aimed at human-centric processes, in other words, those processes that rely on human actors to provide the *agency* (Feldman & Pentland 2003) regardless of the fact that technology can play a large supporting role in enabling the process. Other perspectives in the literature, such as sociomateriality (Orlikowski & Scott 2008) or actor-network theory (Latour 1987), do not privilege the human participant to the same extent.

The test for the Framework is whether firstly, the data can be mapped satisfactory to the conceptual model thereby offering some empirical validation of the constructs; and secondly, what insights can be provided about the empirical data (and hence the circumstances of the organisation), given the structure and organisation of the Framework.

In mapping the empirical data to the conceptual model, as shown in Figure 7, it is evident that the relationships between the entity constructs provide natural way to interpret the real-life data. Mapping (2) highlights the tension between what is sold as a service offering and what can actually be delivered by current capability. The term *adaptive tension* is used in the research literature (McKelvey 2008; Lewin et al. 2011) essentially to describe this gap between the external environmental pressure causing the need for adaptation, and the (organisation's) ability to meet this adaptive requirement by using or reconfiguring the resources available to it.

In mapping (5), an organisational capability is shown as being sourced externally through a partner organisation in order to create a "higher-order" capability to satisfy a market need. Even though this is shown as an addition to the base conceptual model, it is really a special case of the original model where the organisational boundary extends to include the partner organisation resources (i.e. the people, processes and technology) required for that capability. This positions organisational capabilities as "commodities" that exist in the marketplace as value propositions or opportunities for partnerships. This idea resonates with the service science (Maglio & Spohrer 2007) concept of value co-creation.

Mappings (6a) and (8), go to understanding why business process and especially those IT systems supporting the business process are frequently improvised in terms of Excel spreadsheets and ad hoc databases. These relationships offer an understanding of the phenomena at this granular level, but also place them in an overall organisational context, by showing their interdependencies.

5.4.3 Enhancement of the Conceptual Model

The next step in development of the framework is to derive suitable constructs from the empirical data that augment the basic conceptual model and provide the ability to reason about the role of IT alignment in the overall agility of the organisation. The initial candidates for these are presented in Figure 8, which are derived from the mappings in Figure 7. The numbered labels are described in Table 13. Also described are some implications that flow from these constructs, given the context provided by the Framework's conceptual model. These allow inferences to be drawn regarding the research questions¹².

¹² Recall that a narrative style being taken to the presentation of the empirical phase of the research project, in order to show the process by which the framework was developed. Consistent with this, Table 13 represents the constructs at a point in time. As will be seen, these were refined over the course of the subsequent case studies

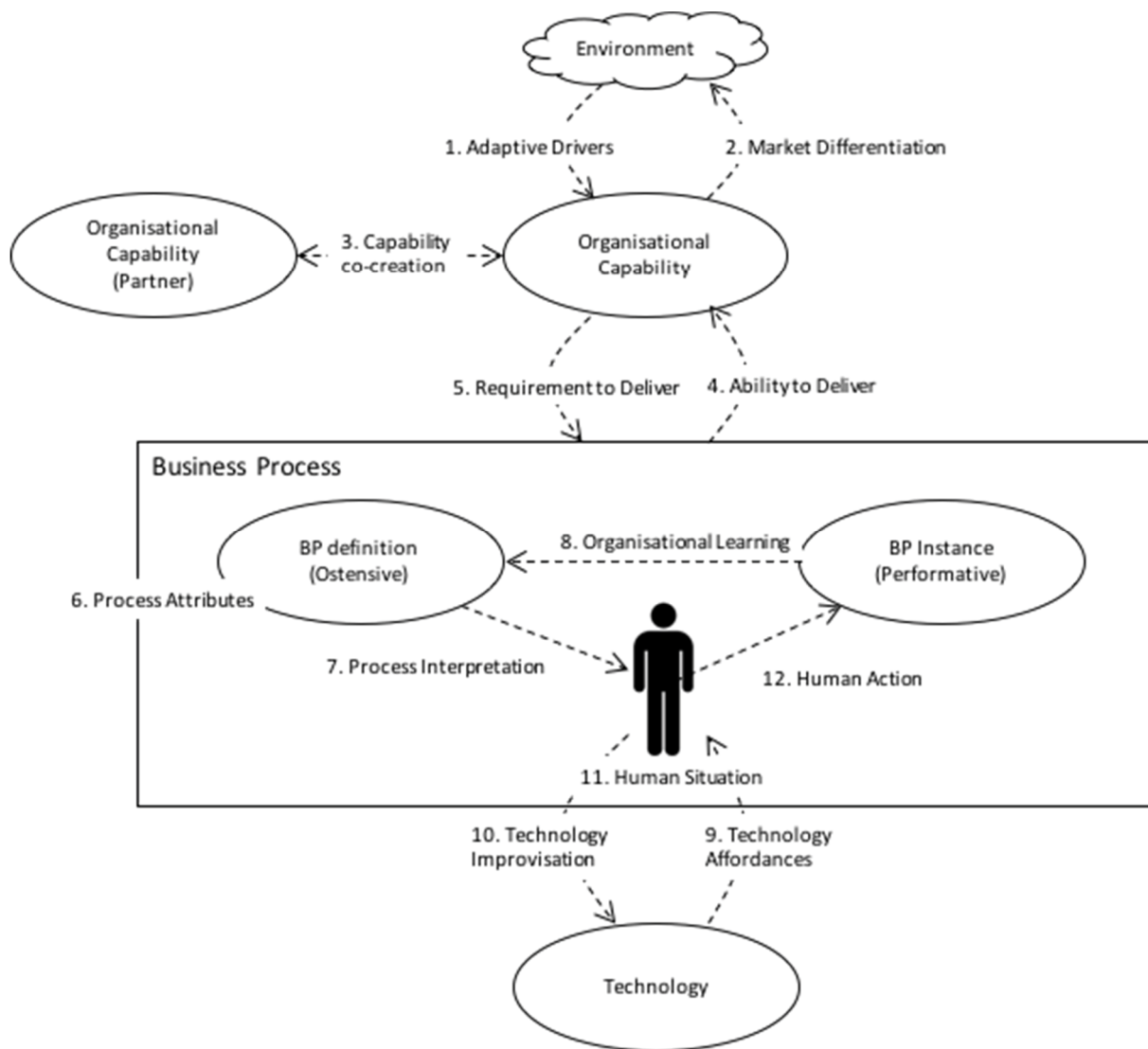


Figure 8 - Enhanced Conceptual Model showing candidate additional constructs

Table 13 – Candidate Additional Construct Descriptions

Construct	Description	Implications
1. Adaptive Drivers	Forces derived from the business environment placing a requirement on the organisational capabilities deployed by the organisation	Pressure through this environmental “interface” places a requirement on the organisation to adjust its portfolio of capabilities or risk going out of business
2. Market Differentiation	The extent to which the capability(ies) being deployed by the organisation offer competitive advantage. This is equivalent to <i>evolutionary fitness</i> of the capability (Helfat et al. 2007). Note that ABC is market-driven not yet market driving	Differentiation in evolutionary terms is a variation in the capability portfolio that confers competitive advantage. In organisational terms, the capability must also be realised by a corresponding ability to deliver (see 4)
3. Capability Co-Creation	A partnership relationship where two organisations are able to develop, from their existing repertoire of capabilities, a new capability.	Capabilities that are co-developed are in name only until they can be delivered by the respective organisational business processes. This implies an integration of business processes (see 4)

Construct	Description	Implications
4. Ability to Deliver	The extent to which an organisational capability can be delivered through the organisation's business processes. This is equivalent to the <i>technical fitness</i> of the capability (Helfat et al. 2007)	The organisation's business processes are the primary means of delivering an organisational capability. A gap in this link is a measure of the delivery capability. The lag between the sensing of the need for a change in capability portfolio and the creation of the delivery capability (e.g. through reconfiguration of business processes) within the organisation is a measure of the organisation's agility.
5. Requirement to Deliver	The requirement placed on the business processes to be able to deliver an organisational capability. Adaptive tension (McKelvey 2008) operates between (4) and (5).	The organisation's business strategy must perform the translation between the competitive drivers (1) and the capabilities that are required to be created and deployed.
6. Process Attributes	Attributes of an ostensive business process that affect the interpretation of them by the human actors (see 7). There are structural attributes, such as the activities, sequence and decisions; strategic attributes such as objectives and goals; and meta-level attributes such as complexity.	The various process attributes remain to be fully elucidated in the context of the Framework. One of the premises of the ostensive aspect of a business process is that it reflects what is <i>generally understood</i> rather than necessarily what is written down in a procedures manual (Feldman & Orlikowski 2011). Thus, there is some subjectivity to the concept. Nevertheless, objective artefacts such as process models and procedures manuals will affect this subjectivity.
7. Process Interpretation	The interpretation the actor places on what to do based on their understanding of the process and contextual factors	There is an interpretation step leading from the process-as-defined to the process-in-practice. Moreover, this also says the human actor may not engage with the process in the first place if the process definition is not perceived to align with their goals.
8. Organisational Learning	Organisational learning covers any mechanism by which the persistent representation of a business process within an organisation is informed by the practice of that business process.	It is key to recognise that this link happens regardless of an attempt by management to explicitly manage it. Thus, it does not necessarily create an outcome that is desirable – or consistent with (4). This is the foundation of the ostensive /performative duality of processes. Management can attempt more active interventions to learn from practice, e.g. process improvement
9. Technology Affordances	A technology affordance represents the perception of what can be done with an item of technology by a user with a particular goal – i.e. the affordance is the potentiality for action of a technology feature.	The decision on how the technology will be used, and the extent to which the process or technology will be “worked around” is central imbrication concept (Leonardi 2011). Thus, the human agent decides on how to achieve their goal based of a set of technology affordances within the context of their understanding of the business process.
10. Technology Improvisation	Those IT systems that are created to fill a perceived gap in existing IT capability.	The improvised “point” technology solutions, such as spreadsheets, over time become a de facto standard part of the organisation's IT portfolio.

Construct	Description	Implications
		Thus, they become available to others as “new” technology affordances (with the concomitant subjectivity in what function they perform). The IT improvisation “loop” occurs regardless of whether it is explicitly managed, which obviously creates challenges for IT management.
11. Human Situation	The circumstances that define a particular human actor’s ability to engage with the business processes and/or technology. This comprises the motivation and goals of the individual as well as skills and experience.	This is central to the concept of affordances: the technology affordances (9) are equally a function of the human actor’s background, skills and motivation as they are the explicit designed features of the processes and technologies. This creates a “human alignment” issue that needs to be recognised by management.
12. Human Action	The action that is taken by the human actor based on the process and technology affordances in order to achieve their goals.	The organisation needs to understand “what actually happened” in order to actively manage desired results (especially 4, 8 and 10).

5.5 Lessons Learned

This section reviews the research methodology as practiced in the case study, with the objective of identifying improvements to be carried forward into the next case study.

Interviews

All participants were happy to have the conversation recorded. The recording provided an opportunity to review the interaction between interviewer and respondent. The main finding was that the interviewer needs to remain silent more often to allow the respondent to contemplate the question and answer, rather than fall to the temptation to fill in the silences. The latter needs to be guarded against to avoid “leading the witness”.

Creation of Transcripts

The decision to create a full transcript of the conversations was proven to be valuable, despite the considerable effort involved. The transcripts provided a rich database of textual information that could be mined and was a source of many illustrative quotations.

5.6 Summary

This chapter has presented the first of three empirical case studies designed to validate and enhance the developing Framework. The following has been highlighted

- The subject of the case study, an IT Services company, demonstrated a requirement for agility to respond a dynamic, competitive marketplace. Technology play a large role enabling its business.

- The case study has applied a qualitative approach using interviews to gather a rich level of information from the executive level (including the CIO's office) down to the operational level of the business.
- The themes in the empirical data have been mapped and assessed against the Framework's conceptual model in order gauge how the observed phenomena could be understood in terms of the latter.
- Improvements to the conceptual model and to the research approach have been discussed.

6 Case Study Two – A Global Pharmaceutical Company

6.1 Introduction

This chapter presents the second of three case studies. The chapter is structured in a similar way to the previous: firstly, the chosen organisation and the reason for its selection are discussed. Secondly the empirical data is presented, organised into themes. Thirdly the data is mapped and assessed against the Framework's conceptual model. Finally, the results are considered from the perspective of the research questions and the further development of the conceptual model.

6.2 Case Study Organisation

6.2.1 Description

The case study organisation, Pharma Inc¹³, is a global pharmaceutical company that conducts research, development, marketing and distribution of drugs into markets around the world. It is based in Europe with local affiliated companies operating in the US, Asia and Oceania. Pharma Inc specialises in niche drugs for rare diseases in several therapeutic areas, including neuroscience, hereditary disorders and gastro-intestinal medicine. Within these categories, it has several leading drugs that are listed on the Pharmaceutical Benefits Scheme (PBS).

Pharma Inc is in a growth phase as it seeks to expand into Asian marketplaces, especially China. The company has also embarked on an internal transformation activity that seeks to rationalise the operations of the organisation that over time has seen business functions and associated IT systems become duplicated due to acquisitions.

Pharma Inc delivers its business via two parallel channels that delineate the operations of the company. The first is where they have a local presence in the marketplace, via a local operating company, and they can sell to physicians directly through their own sales reps. In this model, they develop a close relationship with their customers, the doctors, and develop a detailed understanding of the local regulatory environment. The second channel is where they use a distributor organisation to access markets where they have no local presence. This essentially outsources sales and some of the supply chain, and leverages expertise these companies have in local regulatory requirements.

¹³ A pseudonym

6.2.2 Context

According to Spivey et al. (2013), the research-based pharmaceutical industry, over recent years, has been shaped by several economic forces.

The first of these is the rise of the generic brands. Historically, for research-based drug companies such as Pharma Inc, new intellectual property is represented by the discovery new therapeutic molecules, that can then be patented and thence exploited by their unique position in the marketplace. During this on-patent period, the company has the opportunity to recoup the drug development costs as well as return a profit. Generic brands could enter the marketplace at the expiry of the patent, but could not be regarded as substitutes for the original product as they often have different formulations, standards of production and testing. The game changer was when the US FDA, in the late seventies, required generic brands to be “bioequivalent” to the original innovator’s product, or in other words identical. This meant they could now be prescribed as therapeutically identical substitutes for the original. This was a turning point in the rise of the generics competition.

“Prior to [the FDA changes], an innovation could rely on retaining over 80% of its market share for years after generic entry; now, companies found themselves losing 90% of the market in just 3–6 months, as was the case for products such as Prozac (fluoxetine). Moreover, by the time the third generic copy entered the market, the price for all generics fell to a ‘commodity’ level, minimising profit margins for the generic industry.” (Spivey et al. 2013, p.816).

A second force in the industry has been the decline of R&D productivity despite record levels of investment. The pipeline of new therapeutic molecules has stagnated, requiring drug companies to cast the net wider.

“Speculation suggests that the ‘easy’ targets have already been exploited; that profit potential for pipeline products cannot meet ever-increasing financial targets, causing their abandonment; and that safety concerns require inordinately clean risk profiles for new products even to be submitted to the FDA” (Spivey et al. 2013, p.818).

Whether the pharmaceutical marketplace actually operates as a competitive marketplace has been debated. Typically, the actual cost of developing a product is decoupled from the price obtainable in the marketplace. It is suggested that collusion between companies in “oligopolies” has resulted in

price fixing strategies to secure revenue streams, at the expense of investment in R&D to develop superior products (Spitz & Wickham 2012).

6.2.3 Organisational Capabilities

Like other pharmaceutical companies, Pharma Inc differentiates itself from its competitors across several capability areas. Firstly, within a therapeutic area (e.g. neuroscience), the efficacy of the drug itself is differentiated from competitors based on scientific research data obtained from clinical trials. Whether the drug is actually prescribed for a given patient, however, is dependent on a number of factors including the preferences of the physician based on their own experience, and any considerations arising from the patient's unique circumstances. As well as the drug itself, another capability area is the provision of services. Such services can take the form of special physician education about the drug or funding specific outpatient services that administer the therapy with the drug. It can be noted that the "customer" of a drug company is typically the physician and not the patient. As such, these companies specifically avoid business relationships with their end-consumers. A third area is distribution capability, which includes getting the drug, in high quality form, to where it is needed. This encompasses manufacturing, supply chain and marketing reach.

Research Scope

Pharma Inc organises its global commercial operations under 4 therapeutic areas. The neuroscience business unit within the local operating company was chosen as the primary research scope. This choice satisfies several the required criteria for the research project:

- *Volatile competitive marketplace.* In the niche area that Pharma Inc is competing in, there is not only an increasing market scope to contend with as the organisation expands into Asia, but also competition with several other drugs in the same disease treatment area.
- *Representation of core organisational capabilities:* This business unit exhibits the end-to-end marketing and sales functions. This includes the strategic view where drug marketing strategies are formulated and rolled out; and the tactical view, where sales reps are selling product to Pharma Inc's customers.
- *Significant use of IT to support business processes.* Although the business processes that enable these capabilities are human-centric, the processes are reliant on IT systems ranging from generic CRM systems, through to niche applications for displaying sales material to physicians.

6.2.4 Business Processes

The focus of the study was on the operational business processes that exist to enable the delivery of Pharma Inc's organisational capabilities. Typically, all operational business processes in Pharma Inc are governed by Standard Operating Procedures (SOPs), which place stringent requirements on roles, responsibilities and record keeping. There were two main process areas within the research scope:

- *Sales and marketing.* Even though they are obviously quite different, Pharma Inc has organised these functions together to achieve better alignment. The sales function is carried out on the ground by a team of sales "reps", whose role, having attained a level of product expertise, is to develop relationships with physicians within an area or responsibility (usually geographic) and influence prescribing behaviour. For rare disease therapies, a key outcome is the acquisition of new patients, since each represents a significant additional revenue stream. Physician prescribing behaviour is determined by several factors, including, their knowledge of the drug, its appropriateness for a given patient and whether the drug is reimbursed under the PBS. Thus, within the sales and marketing function, there is a tactical aspect that addresses the education of the practitioner, and a more strategic function aimed product pipeline, patent expiry and PBS registration. Examples of tactical processes within this area are:
 - Prepare Promotional Materials. A process that ensures that new promotional material for a product is appropriately reviewed for accuracy and the evidentiary basis for any claims being made.
 - Conduct Sales Visit to the Practitioner. Core day-to-day business for the sales reps which involves visiting and developing relationships with health practitioners. The reps will use the product promotional materials to educate the practitioner on Pharma's products. The SOPs in this area stipulate what can and can't be discussed at these meetings as well as record keeping requirements.
- *Supply and distribution.* Includes the logistics involved in the supply chain from manufacture to delivery. These processes can either be operated in-house by a local operating company (e.g. in Australia) or via third party distributor organisations where Pharma Inc does not have a local presence in a particular marketplace (e.g. China). Representatives from both distribution models were included in the research. Examples of processes within the distribution area are:

- *Conduct Brand Planning.* Process where a third-party distributor organisation produces a plan for achieving Pharma Inc's marketing targets for a product in a particular market. This includes the milestones to be achieved and the requirements for periodic reporting back to Pharma Inc.
- *Manage Product Supply.* The end-to-end supply chain will be tailored to the specific product packaging requirements, the agreed hand offs to the distributor and particular country regulations.

6.2.5 Use of Information Technology

The types of IT systems in use at Pharma Inc are summarised in

Table 14. As before, three categories are used to delineate the functional scope of the IT systems, as follows:

- Specific IT tools. This covers IT systems that have a specific set of designed functionality to support certain tasks. In these cases, the tools have been acquired to support a specific business process. Examples are, in the case of Pharma Inc, a CRM system, document review management system to train people on the Standard Operating Procedures (SOPs).
- Generic IT tools. These represent tools with a wide range of functionality that are not designed to support a specific business process, but are applicable across a range of tasks and contexts. Examples are word processing, spreadsheets and drawing programs.
- Improvised tools. This category covers a range of home-grown, custom built, tools that have become de-facto standards within some organisational subgroup (e.g. geography or capability area). These have arisen typically to fill functional needs that are not addressed by the other categories, or at least that is the perception.

The purpose of this classification system is to identify and explore where IT has affordances that have been designed specifically to support the business – in other words top down – as against where IT affordances have been improvised, bottom-up.

Table 14 – Pharma Inc: Summary of IT systems supporting operational business

Category of IT system	Examples	Business processes or work type supported	User Base*
Specific IT tools	Viva (CRM) Zinc (document management)	Sales visit tracking Promotional materials review	(OM, O)
General IT tools	Yammer MS Office email	Collaboration, Workflow, file sharing Word processing, spreadsheets General correspondence	(E, OM, O)

Improvised Tools	Viva + Excel	Mail merge for letters to practitioners	(OM, O)
	Yammer + Excel	Tracking meetings	

*User base: (E) – Executive, (OM) – Operations Management, (O) – Operations staff

6.3 Data Analysis

This section presents the empirical results obtained from the case study. The information gained from the interviews is summarised in terms of “themes” that represent commonalities across more than one interviewee. Illustrative quotations are provided to support each thematic idea.

6.3.1 Coding Summary

Figure 9 shows a summary of coded themes against the interviewee organisational level. The bars represent the number of times the theme was coded. Only those themes derived from more than one source have been shown. Of course, as the scores only reflect the degree to which the view was expressed in the interview, this chart *only provides a qualitative picture* of the relative importance of the themes amongst the respondents. Nevertheless, where there is a consistent view being expressed, especially across organisational levels, one can infer that there is a level of evidentiary support for that perspective.

		Executive	Operations management	Operations
	Process Constraint			
1	Cultural differences cause problems			
2	Importance of Knowledge Management			
3	Local versus global requirements tension			
4	Process-driven business			
5	Some processes are very complex or onerous			
6	Tacit knowledge is important			
	Process Flexibility			
7	Processes are intrinsically flexible			
8	Processes are improvised by individuals			
	Technology Constraint			
9	Disconnect between business and IT strategy			
10	IT as a basic hygiene requirement			
11	IT systems poorly deployed			
12	Poor communication of IT strategy			
13	Tool support for process is poor			
	Technology Workaround			
14	Business bypassing IT organisation			
15	IT tools are improvised when needed			

Figure 9 - Pharma Inc –Coding Summary

6.3.2 Themes

The completion of initial case study (ABC) has led to the refinement of the Framework conceptual model. It is now appropriate to refactor the empirical themes into a scheme that better aligns with this model. Moving into the analysis of the second case study (and subsequent ones) this will provide a better means of cross-case comparison¹⁴. Themes were reused across the case studies where there was a fit to the original meaning of the theme.

Themes were grouped as follows (as reflected in Figure 9):

- Process Constraints** – This group is used to represent those factors that adversely impact efficiency or effectiveness of the business process. The former is taken to mean factors such as cost, effort expended or timeliness of the operation of the business process, and the latter is more about whether the business process is meeting its objective of delivering or enabling a particular organisational capability. The focus in this category is on organisational factors rather than technological ones.

¹⁴ This scheme is therefore used for case studies 2 and 3 (and the coding summaries provided in those cases) but not retrofitted to the narrative of the pilot case study in Chapter 5 as these themes were still emergent at that stage. It is however the basis for the cross-case comparison in section 7.5.

- **Process Flexibility** – This group covers where the business process has achieved a level of flexibility in the face of one or more of the previous process constraints, either by design or by practice.
- **Technology Constraints** – These represent either actual or perceived shortcomings of technology that is being used to enable aspects of business processes.
- **Technology Workarounds** – This group represents where specific technology solutions have been developed to work-around the technology constraints, in order to achieve the business process objective.

Process Constraints

1. **Cultural differences cause problems.** As a global organisation, Pharma Inc has operating companies across many countries with non-English speaking backgrounds and with various ethnicities represented in the staff. Interworking is a day-to-day activity across these diverse parts of the overall organisation. Difficulties arise at the basic communication level, but also at a higher attitudinal level where basic cultural differences are evident.

“The IT helpdesk we have is based in Eastern Block Europe. The people that pick up the phone there have got a really heavy accent that is extremely challenging to understand and you know every organisation that I've ever worked for has had their IT helpdesk offshore, and it doesn't matter what accent it is, it's really difficult to try and get somebody to understand what you're saying, and then to understand what they're telling you to do in response” (Operations)

“I think the complexity comes from the way you do business in Asia is very different, so the complexity is really to deal with that, and to work with the partner. A big thing is always around compliance, and you know they give gifts, they give money, they're used to that and you really have to adapt a little bit and be able to understand, to be able to then work with them. You can't just come from a European or a US background and say we're going to do it this way because it just won't work in Asia. So, this is complex.” (Operations Management)

2. **Importance of Knowledge Management.** Staff acquire the competencies to do their work through a combination of experience, training and through access to codified information such as SOPs. There is a realisation at Pharma Inc that there is a gap between what is

codified and what is needed by staff at the coalface. Some knowledge management initiatives have been tried.

“It is hard, I don't know how much you can actually codify [knowledge], I really wonder. I know that they are trying to do that. They put some initiatives in place, but how much can you really put on paper and really explain what happened I don't know. Honestly, I think the experience of people is always more important, more valuable. I think you can do better for sure, because now there is no trace of anything.”
(Operations Management)

“Because I'm in this new role, I'm trying to get that knowledge and I can't get it from anybody. And even if I say let's forget about the past, how is it done today in Europe, can you tell me, if I have to do this contract now in Taiwan can you give me an example of how it is done. I cannot get any answer. So, it's this feeling of being completely on my own, that there is zero knowledge, there is zero guidance there are zero policies. On one side, we're getting bombarded by all these very general policies of how to conduct business et cetera, but really about how you do things practically, there's nothing.” (Operations Management)

“[knowledge is] mostly in the people. They are trying to change that, but we're far from there (Operations Management)

“Now we always do it as if it was the first time, and you know, we just [have to] find things out.” (Operations Management)

“You would never get that true experience background of what was really going on, I think you can never really document that, but at least you document the facts, and the process. I think that would already be like amazing, we have nothing of that. (Operations Management)”

3. **Local versus global requirements tension.** Pharma Inc has evolved as a global company via acquisitions in its various operating countries. Whereas there is a current “One Pharma” initiative aimed at rationalising and centralising core functions, its current state reveals its history as a federation of small companies, each with local operating concerns.

“There is always a tension. You go from centralised to local. Some companies are good at having a blend of that such as [Another large Pharmaceutical Company]. Where they like to encourage local innovation, but at the same time have a degree of centralised control. [Pharma Inc] is very centralised. That occasionally causes problems. So examples of that are a marketing campaign for a particular product, we'll be expected to implement that to the letter. Rather than modify it according to our local needs. Often people who work in a global function have never worked in a local operating company, a local affiliate, and they don't understand what goes on there, but they quite arrogantly impose things without adequate field testing.” (Executive)

“I think it's a mixture of both local and global. So, the processes that drive my day to day activities, like I need to see a certain number of doctors a certain amount of times over the course of a cycle or over the course of the year. So, that's process is set in place by the local affiliate but is driven by a global dashboard where they're measuring these things across the entire organisation and not just their local affiliate.” (Operations)

“Like most IT organisations, we've struggled in the past to keep that level of governance in place to ensure that we can shepherd all of our business requirements through a single point. We come from very much a federated background, from a business and an IT perspective, where we have the various functions that we support across the company, such as technical operations, R&D, corporate functions, those types of things, whereby they would each have their own strategy.” (Global CIO's Office)

4. **Process-driven business.** The pharmaceutical industry is heavily regulated, requiring drug companies to be able demonstrate adherence to due process. This applies to virtually all areas of business, from clinical research, drug registration and the relationship with the health industry.

“We're an industry that is very heavily process centric and with a lot of documentation, SOPs [standard operating procedures] around those

processes, and a lot of regulation around that and a lot of audit activity around that.” (Executive)

“Literally everything we do we have SOPs for it. So, it might be how we manage a request for drugs to be supplied to a patient when the drug hasn't yet been registered in the country, and that's quite a common thing. Everything from procurement to delivery.” (Executive)

“Probably the official company answer would be that the SOP comes first. That is dreamt up by some committee somewhere, about what's the right way to do this process.” (Operations Management)

“So for example an auditor might come out and say I would like to meet a rep and so you would trot in a rep and they will ask them various questions about how they ensure that their detail aid that they're using with the doctor is up-to-date and the most recent version. And they'll say okay can you show me one, and lo and behold, it's out of date. And they'll say this thing is out of date, how did that happen, who gave it to you? Or they might say can I have a look at the boot of your car. And they will always find an out of date something in there. Why hasn't this been destroyed, tell me the process for ensuring you don't have an out of date detail aid.” (Executive)

“For example if it's a meeting and that is very template driven, so the invitation that you use, you download the template and you fill in the information for your event. And if you did something outside the template at least you would be asked to explain and argue case of why you had to do that, or else you just been told no is the template go back and put it in.” (Operations Management)

“...So it depends on the SOP, some of them [no training] happens, as they may or may not be well implemented (laughs). Ones that are meatier and regularly used, like the materials review process, there would be periodically face-to-face training that happens, both on the tools that you use and on what process actually is. (Operations Management)

"It's totally process driven. How well-defined they are varies a lot, and how well followed they are varies a lot. Some things are really rigid and well-documented, and well followed. Others are not." (Operations Management)"

"[processes] that are literally regulated in legislation, there's no discussion about do we have to follow the process or don't we, it's absolutely that you do. And so there's training, and documentation and in some cases tracking that things were done by a certain time point, and reporting and so on. Others are much looser processes, such as, the way that the sales rep is supposed to deliver messages to a customer let's say. You know we train them on how to do that, and they follow the process, but can you realistically actually track that, in real time etc., probably not, it's done on mostly dipstick observations. So there's a whole spectrum." (Operations Management)

"When it's about financial reporting or brand planning, we can adapt. But when it's processes around compliance, and how [the distributor] are supposed to conduct business, then there is zero tolerance. So they had to apply our policies to comply, and this is really strict in the contracts. So for that, they do it. For the rest we have to be flexible (Operations Management)

"Yes well I would be subject to SOPs, I complete an awful lot of training on SOPs, I sign off on SOPs, so I must be governed by them (laughs)."
(Operations)

5. **Some processes are very complex or onerous.** While there is a defined process for much of the business operations at Pharma Inc, there was the view expressed that the level of detail was either not relevant to the day-to-day tasks at hand, or created an incentive to deviate from the process definition.

"Some processes, for example the approvals process we talked about for materials, I mean that is a pretty complex process, but at the same time people who are highly familiar with it and involved with it, it's like water off a duck's back to do it without really thinking, they would

automatically kind of know what the next steps are. That's probably the case for most things, they wouldn't think I'm in the middle of XYZ process, I'm just doing my job.” (Operations Management)

“I follow a step-by-step process but it's a process that's not governed by SOPs. I didn't need to read and sign up to an SOP to know that it's inappropriate to say to a doctor 'look if you prescribe my drug then I'll set you up at the Westies for the weekend', my personal ethic would override that. Of course there's an SOP that governs that but from my point of view is not really a necessary thing but from the organisation's point of view it's necessary for those that would see that differently.” (Operations)

“I think the process of having a call rate allocated to you for a particular group of customers is fine, but where you run into trouble I think he's how do you define those customers. Everyone has different ideas about how to group people. So the A doctors who are the best potential, how do you rank them, and how do you decide that they are a doctor, what's the criteria. And I think that's the kind of thing but really challenges people when it comes to the process of being a rep and seeing customers. It's been restricted and for a long time we were, it's been restricted to 4 categories of people, but if they don't fit into one of those four categories what do you do? We end up doubling up and it doesn't work, and it's a bit of a shemozzle.” (Operations)

“if you want access to something outside of the norm, so what they've loaded on [your PC], then you have to get permission, you have to get approval, you have to jump up and down.” (Operations)

“You know you can use Concur for travel booking and [Pharma Inc] has some ridiculous system which is paper-based or email-based travel requests there is a paper trail and it goes from one person to the next and then goes off to HR group who don't seem capable of booking much. So, I think that's a disaster but Concur as a standalone system works pretty well.” (Operations)

6. **Tacit knowledge is important.** Operational practices are codified only up to a point by SOPs. The SOPs are there to define the minimum requirements for compliance purposes rather than defining how people do their jobs. There is a reliance on tacit knowledge vested in individuals.

“In my opinion, the organisations usually have these [SOPs] not for best practice but for covering their legal butt. So, if anything goes belly up they can say well we delivered an SOP to the representative on this date, they all completed and signed and agreed that they understood it, and if they acted outside the bounds of that then it's on them not on us type of thing. So, that's how I see them really.” (Operations)

“Because I'm in this new role, and have inherited all these contracts, I'm trying to get that knowledge and I can't get it from anybody. And even if I say let's forget about the past, how is it done today in Europe, can you tell me, if I have to do this contract now in Taiwan can you give me an example of how it is done. I cannot get any answer. So it's this feeling of being completely on my own, that there is zero knowledge, there is zero guidance there are zero policies. On one side, we're getting bombarded by all these very general policies of how to conduct business et cetera, but really about how you do things practically, there's nothing.” (Operations Management)

“There are always unique differences between states, in the way people operate. For example, in Western Australia the paediatricians that work in the public sector aren't allowed to see [sales] reps. So, I don't know where you would know that from unless you had experience on the ground in that place is no real feature in our system to say unless you send them a document, a handover document, you wouldn't just know it from looking at the database that the Perth doctors in the public sector can't see you.” (Operations)

“those are all very subjective statements, so you need someone who's got experience, knowledge and expertise, the ability to make a judgement call. (Operations Management)

"[Knowledge is] mostly in the people [at Pharma Inc]. They are trying to change that, but we're far from there." (Operations Management)

Process Flexibility

- 7. Processes are intrinsically flexible.** Whereas SOPs define processes and the minimum level of compliance, in practice there is flexibility at the local operational level.

"So examples of that are a marketing campaign for a particular product, we'll be expected to implement that to the letter. Rather than modify it according to our local needs. Often people who work in a global function have never worked in a local operating company, a local affiliate, and they don't understand what goes on there, but they quite arrogantly impose things without adequate field testing." (Executive)

"The rules are pretty much the same in each country. So, if you can put a regulatory file together for a product that is able to be used in the UK, the US or Europe it should be able to be adapted with minimal change." (Executive)

"I tailor a specific response to each query, using standard documents such as product information or clinical trial information - involving cut and paste where necessary." (Operations)

"The directives for these things appears to come down from global, but I'm always really suspicious of the people that use the word 'global', because I think global is really a bit of a punching bag, so for whatever reason people don't want to say 'yes' they say global said 'no'." (Operations)

"So we'll be a bit more flexible and say look we'll do it this way in Australia if that person sees the benefit. But if they don't see any reason to do differently then they'll say no global says no. I think there are some things that come down from global that you just can't argue with. But in Australia there are a few things that we could get away with that they either choose not to, or choose to get away with, if that makes sense. (Operations)

“From a local perspective there appears to be some sort of wiggle room. From my recent experience, it is dependent on your manager. So, my current manager, with him there appears to be a bit more wiggle room. So, he's quite flexible, he'll say look I appreciate not everyone fits this criterion, so let's make it work for us. Whereas my previous manager was very much "this is the line", this is the way it works, this is who you need to see, go and do it and make it fit. I think it depends on who's managing you and how they work.” (Operations)

“Others are much looser processes, such as, the way that the sales rep is supposed to deliver messages to a customer let's say. You know we train them on how to do that, and they follow the process, but can you realistically actually track that, in real time etc., probably not, it's done on mostly dipstick observations. So, there's a whole spectrum.” (Operations Management)

“So [the distributor] had to apply our policies to comply, and this is really strict in the contracts. So, for that, they do it. For the rest we have to be flexible.” (Operations Management)

- 8. Processes are improvised by individuals.** Whether faced with a poor fit of a global standard or the perception of a better way to achieve the same result, operations staff will often improvise their own way of doing things.

“...things are corporate solutions and what our team does this tweak it ourselves in some way. So we've got Yammer now and we've got that on the iPad and on the iPhone, and I think the whole organisation has Yammer, but no one in Australia really seems to, from a field force point of view, engage their teams in that. Obviously, it's there for everyone to use, but we seem to be the only ones doing it.” (Operations)

“We don't have that functionality installed in Zinc so we have implemented a process where we attach the minutes from our meetings that would cover those things. Also, as we now have product information that is not just in document form - e.g. videos, we cannot

upload them because of bandwidth limitations, so we just attach screen shots and have the video stored elsewhere.” (Operations)

“Because the regulations are subjective they use things like "good taste" and "not bring the industry into disrepute" that some statement is "a fair balance of the body of evidence", those are all very subjective statements, so you need someone who's got experience, knowledge and expertise, the ability to make a judgement call. So yes, that gives rise to a lot of disagreement sometimes, and lobbying and all sorts.” (Operations Management)

“So I experimented with [Yammer] and yes we're using it for a few things. We're running a bunch of meetings with the sales team using doctors to present the latest evidence on our product and all the rest of it. And it works well as a tracking tool for that, so people can see what's happening.” (Operations Management)

Technology Constraints

9. **Disconnect between business and IT Strategy.** The view was strongly expressed (at the operating company level) that the central IT organisation did not seek adequate input to its annual IT planning exercise from the business. As a result, there is a perceived disconnect between local IT needs and the standard corporate IT offerings. Despite this view, the central IT organisation at least expressed the intent of gaining closer ties with the business. It can be inferred that there is an IT organisational maturity issue: that at the current point in time, the IT organisation is struggling to consolidate and deliver basic functionality to the business units. There is a long way to go up the maturity curve before IT becomes responsive to the business needs at a more nuanced level. The corollary to this is that there is a large lag in IT response to changing business imperatives.

“Each year I ask [IT] ‘what is your global strategy so I can have input into it’ and they just scratch their heads and say what do you mean by global strategy.” (Executive)

“I mean I don't even know who are global IT head is, I'd have to go searching, and if I found him, I'd go: ‘Is that right, I'd never heard of him or her...’. So, this is the issue, we don't have business partners in

IT. So, the concept of, you know, if you have a problem you go to Bloggs. Doesn't exist. You pick up the phone and dial the 24 x 7 [Help Desk] and they deal with everything.” (Executive)

“In the six years I've been with [Pharma Inc] I've never seen a request go out during business planning, like go out with every other function, never seen a request to go out saying what do you need for the upcoming year so we can align a central global strategy with the needs of the organisation. It's always top down. And I think it's a real failing. Some of the functions, finance tend to do that, and HR tends to do that, oddly enough.” (Executive)

“So making sure we have a decent handle what's coming down the line from the business, in terms of business requirements. We very much trying to integrate ourselves to get much closer to what the business is doing to make sure that we show more value, further down the line. At the same time, we've got to focus on things like our costs.” (Global CIO's Office)

“We are, the moment, through various initiatives at [Pharma Inc], bringing business units closer together, bringing IT closer together. We come from very much a federated background, from a business and an IT perspective, where we have the various functions that we support across the company, such as technical operations, R&D, corporate functions, those types of things, whereby they would have their own strategy.” (Global CIO's Office)

- 10. IT is a basic “hygiene” requirement.** At Pharma Inc, there is an implicit expectation among staff that IT supports the core business processes as a matter of course. The company has a suite of IT applications that it regards as business critical to company operations, such as CRM, document management and email.

“I think that right now [IT] is probably treated as a hygiene issue, these are things that we all need to do and we're all basically the same. I haven't been in a company that said we're going to make IT a competitive advantage.” (Executive)

"It's a centrally provided system, every part of [Pharma Inc] will use it. It's called VIVA." (Executive)

"Everything gets loaded onto VIVA, its web based so it doesn't matter where we're in the world, the various people who are involved in the review process can look at the documents, and approve them, and or modify them. So, that's a critical thing." (Executive)

"So actually I rely a lot on e-mails and one on one phone calls, but the chat I find very distracting, and I don't like it." (Operations Management)

"Besides CRM the other one that is critical to us, is a promotional review system." (Executive)

"We have corporate functions which obviously have finance, general finance applications, SAP being the predominant one. R&D, which runs various clinical applications, research applications. We've got Tech Ops which is generally our manufacturing area. So, we have various quality systems, structural data capture, structural management systems and applications. We've got our enterprise application groups which are responsible for our warehousing, logistical applications, ERP, SAP as I mentioned. And various applications that we've developed through platforms such as SharePoint, I guess, you could put that into that bracket. Those are the sort of general areas and the types of applications that we're running at [Pharma Inc]." (CIO's Office)

"With Asia I've learned to use a lot of e-mails because it's good to have tracking, and also because of the language or communication barrier." (Operations Management)

- 11. IT systems are poorly deployed.** There is a strong perception that core IT systems have been poorly deployed, from the point of view of the local operating company. There are several components to this.

One is that global IT systems such as CRM, are too "vanilla" to be useful. The other side of this coin is that the global IT function is grappling with consolidation of multiple systems

with multiple provenances, and has therefore adopted a deliberate core system strategy of providing basic common functionality. The gap between the global vanilla offering and the local needs gives rise to the frustrations expressed here and also to some of the workarounds noted elsewhere.

A second part of the perception of poor deployment relates to the IT support function, which is also centralised, accessible only via a help desk and has no local in-country presence.

“A lot of the other senior people around the globe were reliant on video conference and it was a shambles. It wasn't user-friendly, it should have been a lot easier than it was. The technical capability is probably there but people just haven't operationalised it.” (Executive)

“I had a horrendous start to my role, with just the lack of support, and the failure of systems. It was probably the thing that created the most inefficiency in my life in the first few years in the GM role were IT systems that didn't support me properly. So yes, I think it's a big issue. Without being rude to IT people (laughs), I think it reflects the personalities of people who go into IT, they are a little bit Asperger.” (Executive)

“But in the CRM area, which is a highly capable system, has been configured in such a way, and I'm giving you my personal opinion here, that it really lacks utility in helping us to drive our business. It's been configured in such a way that none of the functionality is available to us.” (Operations Management)

“I think we're getting there I think it's been a bit of a struggle. I mean our company has grown up with multiples of the same. We're trying to do a lot of rationalisation around that. So, I think we're definitely on a better track, certainly.” (Global CIO's Office)

“I mean I was standing there at 7 o'clock in a room full of doctors waiting to hear a talk and there was no way of plugging my computer into the data projector.” (Operations)

"I think really good systems such as Concur and the CRM that we have is good, but then not utilising them to the full extent they could. So, they've not taken what they can do and maximise it. They hobble other things and attach them to it, and make you use those instead. (Operations)

"if you want access to something outside of the norm, so what they've loaded on, then you must get permission, you must get approval, you have to jump up and down." (Operations)

"They just bought a job lot of new laptops. Where the directive came from, that was a global initiative idea. So, they bought a big pile of Dell laptops, and when we all came in for a sales meeting, essentially we were sent a series of random and poorly worded emails to prepare us for what we needed to do for the changeover of the laptops, that lots of people didn't even receive." (Operations)

"I think it's 'this is what you get' so just make do and don't complain." (Operations)

- 12. Poor communication of IT strategy.** The IT strategy is not being effectively communicated to the business units at the operating company level. This means that there is a considerable amount of local interpretation and guesswork when it comes to understanding how IT will continue to support the business needs as they change.

"I've asked for that and we haven't been given [the IT strategy]. At a product level, I think [IT] do reach out, and get our input, but at a global overarching IT strategy level, no. I've specifically asked for that and people just sort of look at me and scratch their heads. So yes, I think that maybe it exists, but it's never been shared, I'm not aware of it." (Executive)

"In terms of strategic stuff, we might get an update on that. I don't know how often, but every so often there will be some update. But you're very much a recipient of that not a participant. (Operations Management)

"I have zero visibility, and it's actually very challenging. An example is when we set up our new office in Japan, and IT is a huge part of setting up a new office, especially in a country like Japan where everything is different, it's such a struggle to get the right support from IT. Everyone was giving the ball to someone else, there was no common strategy. So yes, I have zero visibility. The only interaction I have with IT is my computer. (Laughs) so yes if my computer doesn't work..." (Operations Management)

- 13. Tool support for the business process is poor.** Various core business processes such as recording travel, expenses, meeting tracking and contract management are not well supported by IT. The functionality supplied by corporate systems was seen as falling a long way short of needs at the operational level. This is exemplified by the availability of only "vanilla" functionality and lack of integration of systems.

"So for example Concur and the travel booking thing. So, to me the obvious thing is to say this system of booking through [the HRsystem] and then doing the expenses through Concur seems like a big double up of effort when you can book travel through Concur. Why don't we book a travel, or at least have the option to book travel through Concur, so that we can streamline some of the processes that we do. The same with the CRM, could we be agile enough or flexible enough to change the system to suit our needs rather than being forced to change what we do to suit the system." (Operations)

"[the CRM system] is a highly capable, highly flexible system. But the way it's been delivered in [Pharma Inc] specifically, and there's a group in global that manage that delivery, doesn't meet a lot of our needs, put it that way." (Operations Management).

"You find yourself doubling up or duplicating or repeating stuff because there is no automatic connection. And I know because I've been on the other side that integrating systems is not easy, but, that's another big frustration." (Operations Management)

“I know in the legal department may have that. On my side, I have my folder, I have my documents, I have my contracts (laughs). And I have zero systems to tell me oops you know this expires next year et cetera. I have to know it myself.” (Operations Management)

Technology Workarounds

- 14. Business bypassing IT organisation** when they have sourced a local IT solution that fits their needs. In some cases, the central IT function has sanctioned the use of third party solutions (e.g. cloud based solutions such as Yammer) or “bring your own device”. This has allowed them to focus on providing the core IT platforms such as CRM and document management, the downside being the ongoing risk of lack of integration, security and incompatibility issues with these third-party applications. From the perspective of operations staff, the flexibility afforded by these local solutions fills a needs gap that, at least partially, reflects the lack of engagement of the central IT function with the local operation.

“We’ve got our PMO in place, we’re always looking to improve on that intent process to minimise the amount of times that the business feels it has to go around IT, to be able to deliver any types of applications. So, I would say we’re getting stronger, certainly in the last couple of years that has improved enormously, of course were also in the process of trying to get our arms around what happened prior to that, in terms of maybe the lack of governance around bringing in new systems, and new applications.” (Global CIO's Office)

“We need to make sure we work closely with the business as they bring in those new applications so we can make sure we keep our overall architectural stability within our IT design.” (Global CIO's Office)

“So the phone and iPad, if you log into them using your own Apple ID you can put whatever you like on there, as long as you accept, I think you tick a box somewhere, it can all get wiped.” (Operations)

“So we’ve got Yammer now and we’ve got that on the iPad and on the iPhone, and I think the whole organisation has Yammer, but no one in Australia really seems to, from a field force point of view, engage their teams in that. So, that’s something that we do, just John’s team, that’s

something that gets utilised a lot and we've all agreed to do that, and it's quite different to the rest of the affiliates.” (Operations)

“I was really gobsmacked by the lack of cloud within [Pharma Inc]. I can understand why that is, I don't think the [Pharma Inc] is wildly unusual in the Pharma industry because of that. And I was relieved/somewhat excited that there was one cloud based tool that was sanctioned and that was Yammer. So, I experimented with it and yes we're using it for a few things. We're running a bunch of meetings with the sales team using doctors to present the latest evidence on our product and all the rest of it. And it works well as a tracking tool for that, so people can see what's happening.” (Operations Management)

- 15. IT tools are improvised when needed.** When faced with the limitations of the corporate IT offerings, the local operations staff will improvise workarounds or extensions to the existing functionality. These are mainly done using generic Office tools such as Excel. Whereas these afford workable business solutions, the view was that these were approaches of last resort rather than a desirable way to conduct business as usual. Nevertheless, many of these improvised “systems” had become Business as Usual.

“The good thing is, from an agility point of view, you can create it in five minutes. The bad thing is there's not necessarily any robustness around that, you've got data security issues, and you've got knowledge management issues in the sense that that person is off sick, or leaves or moves role and you have someone else trying to work out how does that formula work again and why was it set up this way. So, there's a lot of holes in that approach too.” (Operations Management)

“We don't have a system available to us to track expiry dates of contracts. We've got literally hundreds of contracts with different vendors and that's just at the local level. We need to know when those contracts are coming up and they need to be renewed. I remember contacting global legal and saying that we really need to be tracking these contracts so that we know when to renew them you know people come and go, and no one remembers all of this. And no, they didn't

have anything for us and eventually again we created a spreadsheet and it's not very satisfactory.” (Executive)

“You put in non-validated Band-Aid things so yeah. I could name a few areas where we've done that.” (Executive)

“It's very organic. The [spreadsheet] that's tracking meetings that I mentioned, that came into being because our admin person works across two business units and I said to her "what do you do for those guys", and she said I do this. It was an off-line spreadsheet, and I said that's a good starting point we'll tweak it and then we'll stick it online, somewhere where everyone else can see it. So, that's an organic thing.” (Operations Management)

“Not all the functionality available in Viva or Zinc have been implemented. So, we have to work around. For example, in Zinc there is a conceptual stage where there is a "whiteboard" type function where the initial version can be mocked up. We don't have that functionality installed so we have implemented a process where we attach the minutes from our meetings that would cover those things. Also, as we now have product information that is not just in document form - e.g. videos, we cannot upload them because of bandwidth limitations, so we just attach screen shots and have the video stored elsewhere.” (Operations)

“Also things like if a doctor says to me in a call that they feel a particular way about something, there's no way for me to record that in CRM. I keep a SitRep whether it's a spreadsheet, or document so that I can remember what that's all about because I've got no way of recording it in my database.” (Operations)

“Constantly, constantly. And it really bugs me, I shouldn't need to create spreadsheets in Excel and email them to someone when I've got a CRM that I can create a list in and then someone else in the office can go into the same system and get that list and do something with it. But

at [Pharma Inc] I have to go into the system create the list and then email it to someone else, that doesn't make any sense.” (Operations)

“But the way [the CRM system has] been delivered in [Pharma Inc] specifically, and there's a group in global that manage that delivery, doesn't meet a lot of our needs, put it that way. So, that means that yes a lot of stuff is done in Excel, cooked up local little spreadsheets, all documents whatever it might be, PowerPoint and things, there's millions of examples.” (Operations Management)

6.4 Theoretical Development

6.4.1 Application of the Framework

This section discusses the empirical findings described in the previous section in terms of the Framework that is the subject of this research project. The Framework is an artefact designed to address the problem of understanding how information technology is used within the organisation and the relationship of this to the overall agility of the organisation – or in other words its ability to adapt to the changing requirements of the business environment it is operating in.

At the completion of the previous case study the Framework's conceptual model, depicted in *Figure 8 - Enhanced Conceptual Model* together with some construct definitions that seek to explain the phenomena observed in this problem space. The model depicted has been developed to this point using a combination of theoretical underpinnings and an empirical case study. The latter has served to evaluate and extend the developing model. The Pharma Inc case study is now used to continue this build-evaluate cycle.

We proceed by mapping the empirically derived themes into the conceptual model and then review the insights offered by the model. Figure 10 graphically identifies where the themes fit in terms of the Framework. Table 15 explains these mappings in more detail.

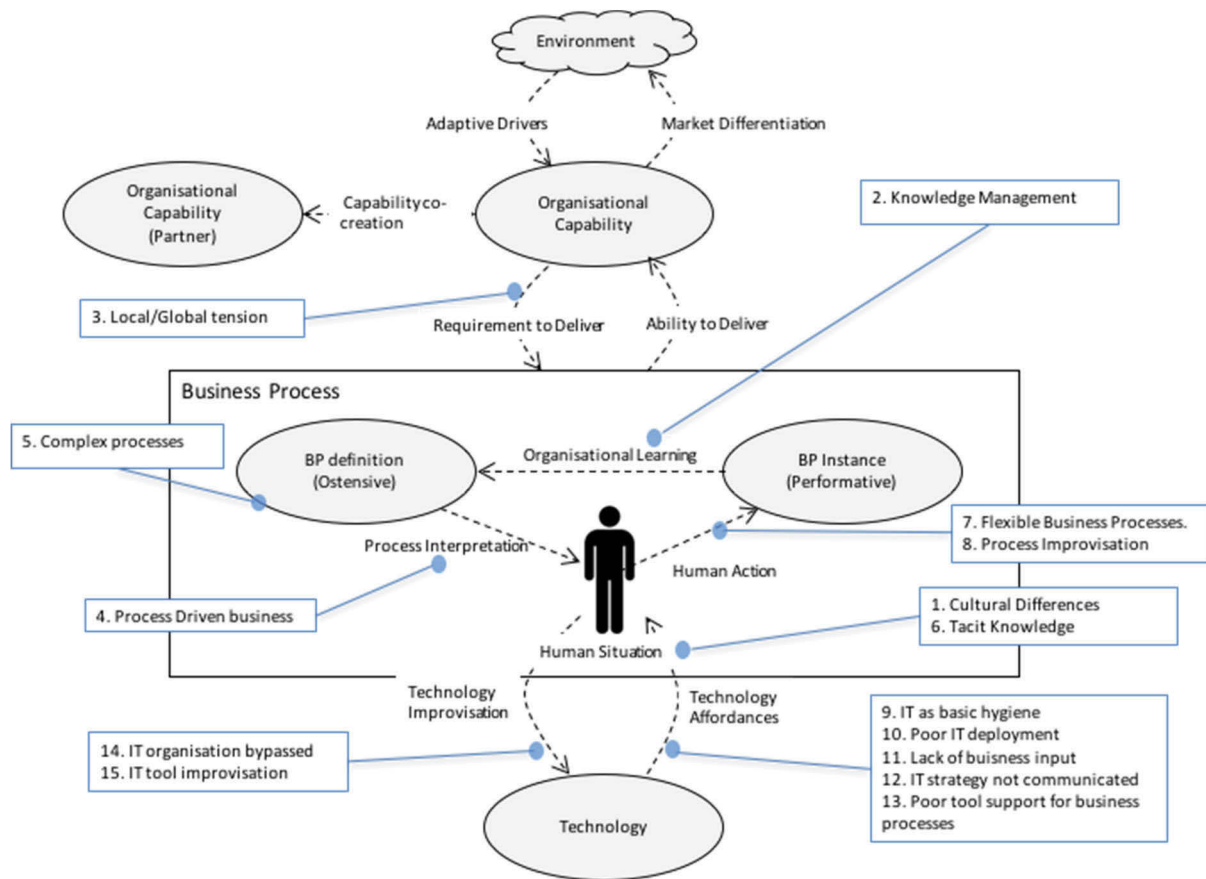


Figure 10 – Pharma Inc: themes mapped to Framework conceptual model

Table 15 – Pharma Inc mapping of empirical themes

Framework Construct	Mapped Themes	Interpretation
Human Situation	1. Cultural differences 6. Tacit knowledge	The Framework recognises that contextual elements govern the way the human actor interacts with the other process and technology elements. The themes mapped here are part of that context. In the case of Pharma Inc, part of the culture relates to how the different ethnicities represented across the various operational areas are accommodated. Organisational scientists have described cultures as the social norms and unwritten rules that define appropriate behaviour (Garfinkel 1967). Hence when faced with the same process (as defined) or technology (as designed), a Person A's cultural background creates a contextualisation that may well determine different behaviours than Person B. Tacit knowledge, that goes beyond what is explicitly written down as part of a process definition, for example, is also something that provides context for each individual participating in the business process. Pharma demonstrated that human judgement and experience is a significant part of how the processes operate in practice.
Organisational Learning	2. Knowledge management	In the Framework, this link relates to how the organisation embeds practice into what is repeatable, via the ostensive process. Explicit definition of processes is only part of the story, as the ostensive process also covers what is generally <i>understood</i> about what the process (or routine) should do (Feldman & Pentland 2003). Pharma Inc has recognised the need for some system of

Framework Construct	Mapped Themes	Interpretation
		knowledge management to capture and underpin operational knowledge vested in individuals. It is clear that, despite various attempts at codifying knowledge in the form of processes and procedures, part of the ostensive nature of, for example, a sales rep's job, is what is generally understood by that role in the industry.
Requirement to deliver	3. Local/global tension	Following the "demand side" link from the organisational capability - that constitutes a requirement for the business processes to deliver an outcome - the tension existing between local operating concerns and the global business directives, at Pharma Inc, operate as conflicting drivers on the business processes. The response of the operational part of the organisation has been determine which requirements are priorities for them and workaround the corporate processes by "designing" their own processes as required.
Ostensive Business Process	5. Complex processes	In this mapping, the nature of the ostensive business processes as they exist in Pharma Inc and how these influence the way they are interpreted by the actor are considered. While Pharma Inc extensively codifies its business processes as Standard Operating Procedures (SOPs), the reality of the ostensive business process is a subtler concept. An example of this was the commentary that, rather than defining desirable practices, the primary reason for these SOPs was to facilitate auditable compliance with the relevant regulations. This suggests the formal process definition only plays a superficial role in defining actual practice.
Process Interpretation	4. Process driven business	The contextualising factors, noted above under Human Situation, operate on the "consumer" end of the link between the actor and the ostensive business process, labelled <i>interpretation</i> in the diagram. As such they are one of the components that determines how the ostensive process is interpreted and subsequently enacted.
Technology Affordances	9. IT as basic "hygiene" 10. Poor IT deployment 11. Lack of business input 12. IT strategy not communicated 13. Poor tool support for process	Technology affordances are different from designed technology features in that they are relational concepts (Majchrzak & Markus 2012). This means they are a function of the designed features plus the perception on the part of the user of how the feature may be exploited to achieve their objectives. In the Framework, the technology user's <i>objectives</i> are jointly determined by how they have interpreted the ostensive business process and their own contextualising factors such as skills and experience. The empirical themes mapped to this locus relate to the how the technology is perceived by Pharma Inc's staff - how the features support their business process objectives. There was an implicit expectation among staff that IT systems were just <i>there</i> and would support their operational needs. Respondents thus were quick to remark on their perceptions of the negative aspects of IT within the organisation. These perceptions can be distinguished into two areas. Firstly, that the features themselves were not necessarily designed in the first place to meet the needs of the process or the strategic intent of the business, and, secondly, that the features may well have been present in the technology, but the organisation had not deployed them adequately, so that were not available to be used.
Technology Improvisation	14. IT organisation by-passed 15. IT tool improvisation	For some users, the technology affordances provide sufficient opportunity to support their practice of the business process they participate in. For others, however, there is sufficient incentive for them to improvise their own technology features. The importance of the concept of technology affordance is that it is a subjective perception of technology usefulness to the task at hand rather than an objective assessment of designed technology features. This means that if the technology affordance appropriate to the business process

Framework Construct	Mapped Themes	Interpretation
		task at hand is “missing”, then it is as if the technology features themselves are not present. There were several instances of this phenomenon evident at Pharma Inc. One instance was when a local business unit decided on some new productivity tool – such as Yammer - that was not (perceived to be) available via the corporate application suite. This, of course, could be because of a deliberate strategy on the part of the global IT function not to provide the function, but also because the function exists but has not been adequately deployed or is functionally deficient. Another instance was where local improvisations – usually in Excel – were created to work around these affordance gaps. Effectively creating new technology features and therefore new affordances for those staff who are party to the creation and use of these improvisations. The additional inference from the Framework is that these workarounds and improvisations become part of the business process-as-practiced, and, via the organisational learning loop, become the ostensive process that defines business-as-usual.
Human Action	7. Flexible business processes 8. Process improvisation	In the Framework, the human actor enacts an instance of the business process, known as the performative process, which is a function of the interpretive and contextual factors discussed previously. The performative process reflects the actual work that is done in the organisation to deliver a given organisational capability. At Pharma Inc, it was apparent that there was an amount of variability in how processes were enacted. Staff members such as sales reps have a freedom within the overall process constraints to “do things their own way”, which equates to process flexibility. There was also a degree of improvisation on the part of the staff whereby the process was actually <i>changed</i> through it being practiced. Both situations arise when the individual’s contextual factors and goals override the expectation that is derived purely from the ostensive process. The variety introduced here is key to how processes evolve within the organisation (Pentland et al. 2012). However, the evolution of the process also provides the opportunity for a drift away from outcome “desired” by the organisation (i.e. the realisation of a given organisational capability), especially if the process-as-practiced becomes embedded in the ostensive process-as-defined through organisational learning. This suggests a tension between, on the one hand, top-down process alignment to organisational imperatives (to be able to deploy a given organisational capability), and on the other a bottom-up evolutionary process that can potentially lead away from this alignment.

6.4.2 Insights for Organisational Agility

Table 15 illustrates the empirical themes discovered at Pharma Inc in term of the Framework constructs and offers some construct-level interpretations that go toward explaining the observed phenomena. However, the purpose of the Framework is to go beyond this and offer a view of how these aspects of internal “organisational wiring” play a role in the organisation’s ability to adapt to its environment and be agile. As depicted in the extra-organisational view in Figure 4 – , the *organisational capability* is the entity that mediates the link between the internal and external

organisational environments. Simply put, the external environment places a requirement on the organisation to deploy certain capabilities – the imperative to adapt. The organisation responds by attempting to deliver these capabilities via its business processes, realised by human agency which involves the use of technology.

Figure 11 presents a view of the Framework model that examines these bigger picture relationships. There are several possible points of disconnection within this model that lead to a lack of alignment between the internal and external environments. Starting from the top left of the diagram, emanating from the environment, is the imperative for the organisation to adapt its capability portfolio (label A in the diagram). In Pharma Inc's case this has two aspects: it is both a competitive market force based on its product offerings, but also a regulatory compliance imperative. Following the Resource-Based View (Barney 1991), the organisation's capabilities are a function of its processes, people and technology assets. The ostensive business process (B) provides the path-dependent component of these capabilities, in other words, what the organisation has learned about what has worked in the past. As noted by several authors (e.g. Schreyogg & Kliesch-Eberl 2007), this can give rise to lock-in and an inability to change. At this point, the organisation can intentionally redesign its business processes to create or modify a capability. This type of activity could take the form of an organisational transformation program, for example.

The right-hand side of the diagram can be regarded as the socio-technical component that is responsible for the capabilities that are actually *realised* and can then be deployed into the environment (C). At an abstract level these form the organisation's adaptive responses to the environment. For Pharma Inc, they can represent commercial value propositions that are a function of its realised capabilities, and also their response to regulatory compliance requirements. As we have seen, the realised capabilities are delivered by the business process-as-practiced (D), taking into account the interpretive aspects of human agency and technology affordances. Of course, the environment decides whether the *deployed* capability satisfies the *required* capability, and hence the feedback loop depicted in the diagram (E).

The organisational learning loop (F) adds another wrinkle into this picture. The ostensive business process is not a static representation of some a priori design: instead it is a definition that moves in line with what is learned from practice. "Learned" is used in a wide sense here: it not only refers to an intentional activity but also it is the necessary by-product of performative-ostensive relationship. So, in this latter sense, it is *inevitable* that the practice will induce a drift away from the process-as-designed.

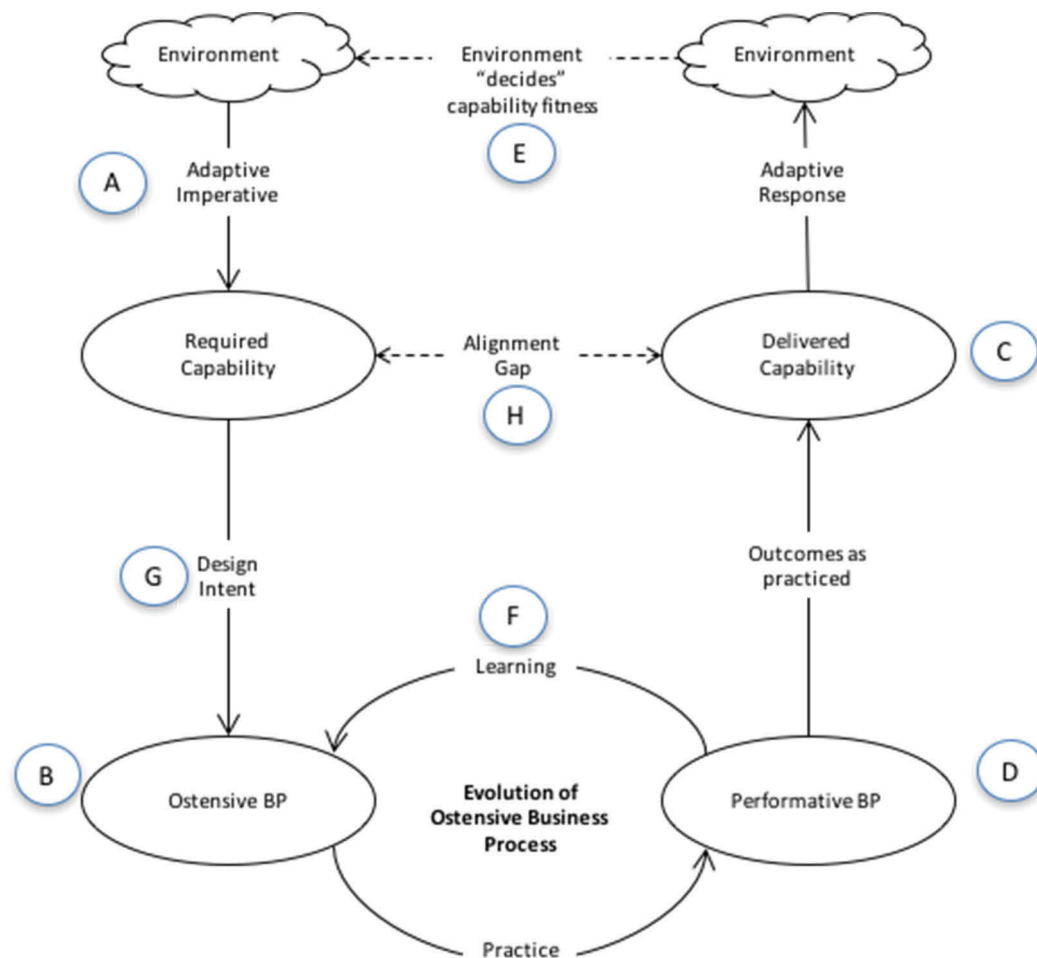


Figure 11 – Framework model of Internal/External Alignment

At Pharma Inc, the impact of regulatory compliance imperatives was more in evidence than those associated with competitive pressures. If, for example, we take one of Pharma Inc’s organisational capabilities, “Educate Medical Practitioners on Drug Benefits”, we can see that the regulatory compliance requirements operate on *how* this capability is realised – in the business processes – rather than *what* the capability is, by placing constraints on what can and can’t be done and requiring the events to be tracked, auditable and so forth. This can be viewed as additional constraints operating on the ostensive business process (B). Firstly, there is a requirement for the ostensive process to be explicitly represented (e.g. in SOPs) and secondly there is a need for close monitoring of the process-as-practiced (D) (e.g. via auditing) to ensure it is compliant. In this there is not necessarily a large impact at the capability level. Notwithstanding this, the finding from the case study showed that although these “additional” constraints on the business process existed, the BP evolution loop was still very much in evidence. This included leeway in how well the SOP’s defined the process, providing opportunity for interpretation, as well as technology workarounds becoming “business as usual” practice.

An interesting situation is where the compliance imperatives conflict with the other commercial competitive imperatives at the capability level. Certainly, this applies to the “Educate Medical Practitioners on Drug Benefits” capability, which is not only a key marketing tool, but also a differentiator for Pharma Inc. It is the finer grained views of this capability that provide the insights into this. For example, the “capability to target the right practitioner”, or “deliver the product information in compelling form” are two sub-capabilities, and are the areas where Pharma Inc differentiates itself. These imperatives act on (A) and (G) in Figure 11, as the organisation, through strategic management, decides on how to differentiate its products in the marketplace. The ostensive processes are “designed” with the intention of realising these capabilities. At the process level, these are manifested in things like how doctors are ranked and how often they are visited by the sales reps, or what form the product information takes and how it is presented. These are balanced by strict regulatory requirements around what can and can’t be said to the doctors, what sort of information can be presented and so on. The net effect is one of evolutionary adaptation operating under defined constraints leading to some “local optimum” state where both drivers are accommodated to some point.

With the ostensive business process evolving in this way, a question arises as to how the organisation detects excessive drift and realigns the process to the top-down imperatives. The Framework characterises the outcome of this drift in terms of an organisational capability gap (H). Morgan (1997) in discussing the “learning organisation”, shows the need for a second order, self-regulating capability that monitors the first level process (i.e. the evolution of business process in this case) and understand when operating norms need to change.

Such monitoring functions were in evidence at two levels at Pharma Inc. The first operates at the *how* level, the business processes, and says does the practice comply with the intent? An example of this is the internal regulatory audit function. This function is not about “are we doing the right process”, the assumption is that the SOP and other formalised process definitions are implicitly correct, and it remains to just bring the practice back into alignment with that. The second is at the *what* level: a higher order strategic function that maintains the relevance of the business processes to what the organisation is strategically trying to achieve, at the organisational capability level. The strategic management function is the obvious candidate here, but the assumption with that is that the management “know” what the right capabilities are and therefore what a capability gap actually means. As stated previously, despite management intention, ultimately it is the environment (E) that decides this question.

The model depicted in Figure 11 has a correspondence to dynamic capability theory and in doing so provides some insight into its foundations¹⁵. *Sensing* the need to respond to environment change (A, in the diagram), and *reconfiguring* the resource base (G and B) correspond to Teece's (2007) model. The requirement for an alignment monitoring function (operating at H) corresponds to the monitoring dynamic capability suggested by Schreyogg and Kliesch-Eberl (2007). The additional subtlety offered by the framework is in identifying the tension between the "top down" intent to reconfigure the business processes with the "bottom up" resistance to change that emanates from the ostensive-performative nature of the business processes.

6.4.3 Cross-Case Analysis

This section compares the two case studies - ABC and Pharma Inc - with the objective of understanding the application of the Framework in two industry sectors that offer a combination of similar and different circumstances with which to evaluate the research.

While both ABC and Pharma Inc operate in dynamic, commercial business environments¹⁶, there are some interesting differences that provide opportunities to evaluate the Framework. The first point of difference is Pharma Inc's narrow competitive focus, reflected in its small portfolio of niche products. For each product in its repertoire, there are only one or two other players in the market and they will likely have very similar products. Competitive differentiation is based on finely nuanced criteria such as sub-populations of patients that are likely to have higher benefit-cost outcomes for Pharma's product, based on research evidence; or the provision of value-add services as an adjunct to the medication, thereby, in total, providing a better patient outcome than just the medication alone. ABC, in contrast, operates in a large multi-levelled market where there are many players. "Products" as such are more complex assemblages of services and commoditised offerings that are differentiated on criteria such as cost, but also on corporate reputation, and delivery track record.

A second point is the role of the regulatory environment in Pharma Inc's business. This operates as a constraint on company operations at the business process level. While ABC operates in its own regulatory environment, the strictures imposed do not relate overall to core business capabilities, but are more about general legal and financial responsibilities. Of course, with both case study

¹⁵ this is elaborated on in chapter 9

¹⁶ Refer to the list of key characteristics in *Table 6 - Synopsis of Case Study Organisations*

organisations, there is a level playing field for the respective competitors in this regard. Regulation is a constraint that all in the marketplace must deal with as a condition of participation.

Notwithstanding the differences mentioned, there are many commonalities between the two organisations, and these are manifested in the empirical data. One can recognise across these two case studies, the replication of some familiar patterns, both in terms of circumstances and in terms of how each organisation responded to these circumstances. Table 16 lists common themes.

Table 16 – Common empirical themes for both ABC and Pharma Inc

Process Constraints
• Some processes are very complex or onerous
• Local versus global requirements tension
• Knowledge Management is an important activity
• Cultural differences cause problems
Process Flexibility
• Processes are improvised by individuals
• Processes are intrinsically flexible
Technology Constraints
• Tool support for process is poor
• IT systems poorly deployed
• Poor communication of IT strategy
Technology Workarounds
• IT tools are improvised when needed

In summary, for both organisations the Framework’s core socio-technical constructs and the associated behaviour they imply were born out in the observations:

- The human action is *situated* – the actions taken by people are functions of their context, their understanding of what their context and their motivation.
- Patterns of practice emerge as workarounds become business-as-usual
- The “what” of the organisational capability is dissociated from the “how” it is implemented (in terms of people, processes and technology). There is a potential alignment gap as path-dependency with how things are done gains the upper hand at the expense of alignment with the organisation’s strategic imperatives.

6.5 Summary

This chapter has presented the second of three empirical case studies designed to validate and enhance the developing Framework. The following has been highlighted

- The subject of the case study, a multinational pharmaceutical company, fulfils the requirements to be included in the research project. It exists in a dynamic, commercial environment and in one that is highly regulated. Technology play a large role enabling its business.
- The case study has applied a qualitative approach using interviews to gather a rich level of information from the executive level (including the CIO's office) down to the operational level of the business.
- The emergent empirical themes have been mapped and assessed against the Framework's conceptual model in order gauge how the observed phenomena could be understood in terms of the latter.
- The insights that the nascent model offers into organisational agility have been discussed.
- A comparison of the two case studies to date has been presented, noting commonality of themes.

7 Case Study Three – A Retail Company

7.1 Introduction

This chapter presents the final of three case studies. The chapter is structured in a similar way to the previous: firstly, the chosen organisation and the reason for its selection are discussed. Secondly the empirical data is presented, organised into themes. Thirdly the data is mapped and assessed against the Framework's conceptual model. Finally, the results are considered from the perspective of the research questions and the further development of the conceptual model.

7.2 Case Study Organisation

7.2.1 Description

The case study organisation, SupaMart¹⁷, is a leading retailer in the Australian marketplace, specialising in supermarkets, liquor and general merchandising department stores. With over 900 supermarkets it is an iconic local brand with a high public profile. The company has several lines of business each operating under its own brand and in its own marketplace, but sharing common infrastructure services such as supply, warehousing and distribution. While supermarkets and liquor are highly profitable, other parts of the business such as general merchandising have lagged. The latter has been the subject of a transformation exercise to refurbish stores and improve business processes and IT systems, with the objective of improving their performance.

SupaMart is pursuing several strategic priorities. A significant initiative is a renewed focus on the customer experience and “digitisation” involving new channels, improved knowledge of buying habits through loyalty programs and associated data analytics. SupaMart is also expanding its brand portfolio into new lines of business such as home hardware. At the same time as these market-focussed activities, SupaMart is also pursuing operational excellence through supply chain efficiencies.

7.2.2 Context

The Australian retail landscape is facing a number of drivers for change. According to Gartner (2015) there is a trend to a customer-centric, multi-channel model in retailing, driven by digitization of the business, as shown in Figure 12. Against this backdrop, large, traditional bricks and mortar players

¹⁷ A pseudonym

such as SupaMart have had to shift their operating models and adopt new channels such as online or mobile apps, or develop new hybrids such as “click and collect”.

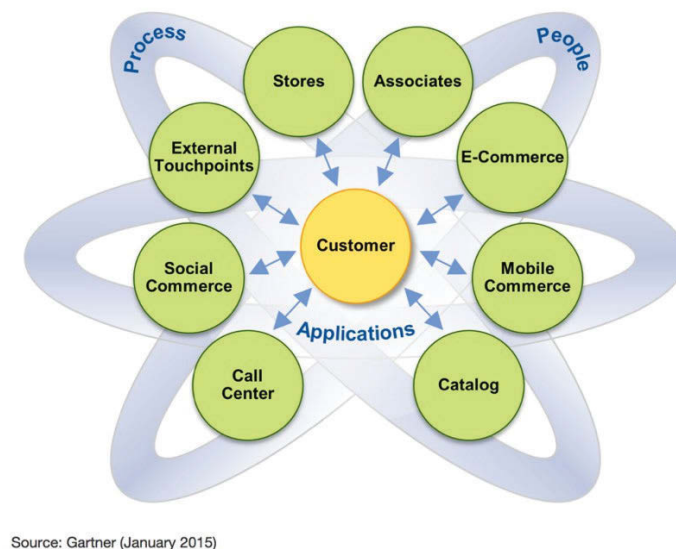


Figure 12 – Gartner’s Retail Agenda Overview

Another driver for change has been the arrival of low cost players such as Aldi that have achieved a significant foothold and that have taken market share away from SupaMart at the budget end of the business. These new entrants have given cause for SupaMart to refine how it differentiates itself. One strategy has been to move from being purely a lowest prices competitor to one that offers “premium-isation”, or in other words, an ability for customers to buy premium products within the same store as the basic food staples.

7.2.3 Research Scope

Organisational Capabilities

SupaMart is a large company with more than 100,000 staff and operating several discrete lines of business in hundreds of locations across the country. The selection of the research scope was guided on the one hand by the basic research question, requiring a dynamic organisational context in which there is pressure to adapt capabilities, business processes and supporting technology within competitive timeframes; and on the other hand, pragmatism such that the research was a tractable exercise. This latter point included getting access to the necessary levels of management so that a plurality of viewpoints could be obtained to get a reasonable triangulation on the inferred outcomes.

The researcher was fortunate to gain access to the ideal subject matter in this respect: The Retail Services division, which looks after common services provided to all brand lines of business (i.e. the stores themselves), including these capability areas: supply chain, procurement, loyalty programs, marketing campaign management, call centre operations and information technology. Access was gained to the executive level, operational management and operational level personnel across this division. This part of the business fulfilled the essential research criteria, as follows:

- *Dynamic environment imposing pressure on the business to adapt.* Retail Services deals with both the customer and supplier domains, both of which are highly competitive and volatile. The customer loyalty program is an example of an area of the business in the midst of the emerging customer-centric, multi-channel strategic drive alluded to (Gartner Inc 2015).
- *Representation of core organisational capabilities.* This business area represents core retail industry capabilities, as opposed to routine back office functions such as HR and finance.
- *Significant use of IT to support business processes.* Although the business processes that enable these capabilities are human-centric, the processes are reliant on IT systems ranging across supply chain ERP systems, merchandising systems and point of sale (POS) systems, derived from commercial package-based solutions alongside custom developed applications.

Business Processes

The focus of the study was on the operational business processes that exist to enable the delivery of SupaMart's organisational capabilities within the Retail Services division. The following are examples of business processes areas within this scope.

- Customer Loyalty
 - *Develop marketing campaign.* The outcome of this process is a targeted marketing campaign aimed at a customer segment. The process entails the requirements gathering across the business units, development of the business case and definition of the promotional offer. SupaMart engages a third party digital marketing agency for production and communication of the campaign.
- Procurement
 - *Replenish store.* Store replenishment is a core process with two basic variants. One is classed as a "pull" mechanism where replenishment is triggered in response to system tracked stock levels. Most supermarket stock (about 90%) is controlled this way. The other variant is a "push" mechanism where stock is allocated to the stores

independently of the current stock level, and is carried as inventory. This method is common in the general merchandising business.

- *Range a new product.* This process can include signing up a new supplier or just an agreement to range a new product from an existing supplier. This process includes negotiating costs and volume supply to which stores; building the product range into the merchandising system and developing the shelving plan. The performance of this process is key to SupaMart's ability to respond quickly to changes in market demand.
- *Determine product quality issue root cause.* Product quality and safety are of paramount importance to SupaMart. This process can be triggered as an escalation from a customer call into the contact centre if, for example, a piece of metal is found in a food item; or prompted by a "trending" complaint. The analysis that follows often leads back to the supplier for remedial action.
- **Call Centre**
 - *Handle customer enquiry or complaint.* SupaMart engages a third-party contact centre service provider, but retains the strategy and oversight functions. The contact centre operation is becoming increasingly more sophisticated as the trend towards customer-centricity and multiple channels picks up pace. The customer's context for making an enquiry or complaint is more complex: the contact centre is the front-end for all channels into the business, and the customer may be interacting across multiple channels. There is a focus now on understanding the customer's "journey" and being more predictive about customer behaviour.

Use of Information Technology

The types of IT systems within the research scope in use at SupaMart are summarised in Table 17.

As before, three categories are used to delineate the functional scope of the IT systems, as follows:

- **Specific IT tools.** This covers IT systems that have a specific set of designed functionality to support certain tasks. In these cases, the tools have been acquired to support a specific business process. An example is SupaMart's portfolio of specific retail systems such as ordering, merchandising, point of sale and store shelf planning systems.
- **Generic IT tools.** These represent tools with a wide range of functionality that are not designed to support a specific business process, but are applicable across a range of tasks and contexts. Examples are word processing, spreadsheets, or generic mobile platforms such as iPads.

- **Improvised tools.** This category covers a range of home-grown, custom built, tools that have become de-facto standards within some organisational subgroup (e.g. geography or capability area). These have arisen typically to fill functional needs that are not addressed by the other categories, or at least that is the perception.

The purpose of this classification system is to identify and explore where IT has affordances that have been designed specifically to support the business – in other words top down – as against where IT affordances have been improvised, bottom-up.

Table 17 – SupaMart: Summary of IT systems supporting operational business

Category of IT system	Examples	Business processes or work type supported	User Base*
Specific	Customer Information System Enterprise Data Warehouse Loyalty Management System Marketing data mart	Marketing campaign management	OM, O
Specific	SAP Retail Retalix Point of Sale JDA replenishment	Procurement: Ordering, replenishment	OM, O
Specific	Genesys	Contact centre	O
Generic	MS Office Google apps	General business support Online chat	All
Improvised	Workflow management (based on Google apps) Business Intelligence system (based on MS Access)	Marketing campaign management	OM, O

*User base: (E) – Executive, (OM) – Operations Management, (O) – Operations staff

7.3 Data Analysis

This section presents the empirical results obtained from the case study. The information gained from the interviews is summarised in terms of “themes” that represent commonalities across more than one interviewee. Illustrative quotations are provided to support each thematic idea.

7.3.1 Coding Summary

Figure 13 shows a summary of coded themes against the interviewee organisational level. The bars represent the coding frequency of the theme (normalised for the number of respondents at that organisational level). Only those themes derived from more than one source have been shown. Of course, as the scores only reflect the degree to which the view was expressed in the interview, this chart *only provides a qualitative picture* of the relative importance of the themes amongst the

respondents. Nevertheless, where there is a consistent view being expressed, especially across organisational levels, one can infer that there is a level of evidentiary support for that perspective.

Theme	Executive	Operations management	Operations
New Capability			
1 Developing new capability			
Ability to Respond			
2 Business planning lag			
Process Constraint			
3 IT systems constraining the process			
4 Quality - time trade offs			
5 Some processes are very complex or onerous			
6 Tacit knowledge is important			
7 The need for scalability			
Process Flexibility			
8 Agility through third party suppliers			
9 Balance formality with pragmatism			
10 Human judgement is part of process			
11 Multi skilled teams			
12 New processes are designed			
13 Processes are improvised by individuals			
Technology Constraint			
14 Barriers to using internal IT			
15 Disconnect between business and IT strategy			
16 IT not aligned to changing business needs			
17 IT system defining the process			
18 Systems are hard to understand, not intuitive			
Technology Workaround			
19 Improvised tools create agility			
20 IT tools are improvised when needed			

Figure 13 – SupaMart: Coding Summary by Theme

7.3.2 Themes

As with the other cases studies, the emergent themes were grouped. Themes were reused across the case studies where there was a fit to the original meaning of the theme. This allowed cross-case comparison.

In the case of SupaMart, the themes fell naturally into the following groups (as reflected in Figure 13):

- **New Capability.** This group covers where SupaMart has developed a new organisational capability and deployed it as commercial value proposition.
- **Ability to Respond.** This group represents where there is lag between a sensed requirement to act, for example, in response to a competitor's move in the marketplace, and the action being effected.

- **Process Constraints** – This group is used to represent those factors that adversely impact efficiency or effectiveness of the business process. The former is taken to mean factors such as cost, effort expended or timeliness of the operation of the business process, and the latter is more about whether the business process is meeting its objective of delivering or enabling a particular organisational capability. The focus in this category is on organisational factors rather than technological ones.
- **Process Flexibility** – This group covers where the business process has achieved a level of flexibility in the face of one or more of the previous process constraints, either by design or by practice.
- **Technology Constraints** – These represent either actual or perceived shortcomings of technology that is being used to enable aspects of business processes.
- **Technology Workarounds** – This group represents where specific technology solutions have been developed to work-around the technology constraints, in order to achieve the business process objective.

New Capability

1. **Developing new capability.** SupaMart has embarked on a strategy to develop new lines of business and enter new markets. An example of this is the new phone products sold within supermarkets, involving a partnership with a Telco service provider. This type of activity has leveraged SupaMart's existing processes and capabilities meaning areas such as the contact centre have had to take on the role of supporting such new product lines.

"The best way to work this is you always launch small and grow. So, Telco's a good example, to launch with a prepaid product, simple, you know, what do customers need for prepay, they need simple recharge and activate. So, that's a way you build capability, then you progressively launch into different products (OM)"

Another example is SupaMart's venture into convenience stores, a small supermarket format that is tailored to a particular locality. These stores require the flexibility to be able to range products that compete with the niche local stores, rather than replicate a more standardised supermarket blueprint.

"We're only a new division, so we were actually the first store on the ground for convenience. [A Sydney location] was the second. We're the fastest growing division in the company at the moment. So, we tailor

the store to the demographic, the customer demographic. So, you go from here to Woolloomooloo, we've got a very different range to Central station, we've got a store at Central station, very different range again...A lot of the new lines we've been running and introduced into the business, supermarkets have now taken on into their business, because it works in here, we've sourced a vendor, we've done all the work for them, they've gone hey it works and they've ranged into the supermarkets." (O)

Organisational Inertia

2. **Business planning lag.** Marketing campaigns are driven out of the business divisions representing SupaMart's various brands, and can have a strategic or tactical focus. The ability to respond to a tactical imperative, such as what a rival competitor is doing, is a key capability. In practice, the requirements for new campaigns are funnelled through a single marketing operations area, which has had to adopt a reactive rather than proactive role in designing the campaigns.

"Our biggest constraint is a lack of up front planning with the divisions. The supermarkets will have its catalogue planned 12 months in advance. So, supermarkets aren't too bad, we get a view of how we can connect into those. But the other divisions, we mightn't know what it is they want to do. We mightn't know until a week before we're meant to have all the requirements about the types of campaigns" (OM)

"It's probably the strategic versus operational nature of those [campaigns] that manifests itself into 80% of the time we're not getting the right notification around what do you want to do tactically. So, you could say in there that our whole model is flawed, because we should just be able to service stuff in real time, the reality is we can't and no-one is really doing that in real time anyway." (OM)

Process Constraints

3. **IT systems constraining the process.** There are specific instances where the business process is being constrained by key IT systems, as a function of the way they have been

designed or deployed operationally. In the following three instances, these constraints directly impact the agility of SupaMart's customer facing organisational capabilities.

"Once [a product] is ranged into the store, it's probably around a 3-day process, before it physically appears in the store, depending on where it's from. We're going probably about as fast as we can. [The constraint is] generally IT systems, and when their jobs run. When applications put information into tables that other applications need to read into other tables." (OM)

"[Call centre operators] usually operate with two monitors, but nothing integrated, all separate. If I call and ask about store location information or opening hours, different screen. If I call about an online issue, different screen. So, the challenge with a large organisation is we have our data and information siloed." (OM)

"Because of the limitations of the systems, both on our side and on the [marketing] agency side, the data transfer takes a lot of time. So, we're not able to use the right information in our campaign." (O)

- 4. Quality/time trade-offs.** While being able to respond quickly to market imperatives is a major driver for SupaMart, they have experienced a tension between time and quality in the marketing campaign business.

"You can't have all flexibility. The whole time, cost, quality quadrant, something's got to give. If you're after time and you want low cost, do it really fast, and I don't want to be paying heaps for it, then quality suffers. So, we're kind of in that space at the moment, we're going through a bit of a transformation around our people and process, to be able to deliver a better quality product at ideally a good cost." (OM)

"Six months ago, yes there was pressure to turnaround the campaigns much faster, to reduce the cycle time, however we ended up getting so many defective campaigns out the door. Defects like missing offer end date, missing a particular customer or doesn't have the right offer or the right image anything under the sun. This is where senior

management took a decision to focus more on quality and not to put pressure on the timeline.” (O)

5. **Some processes are very complex or onerous.** Some processes, such as development of marketing campaigns, can be intrinsically complex. Other processes have grown to be complex over time.

“Historically [processes have been complex], the number of steps involved that a user has to do. The supermarket business has gone through a massive campaign in the last two years to simplify the processes. It’s really been about taking our training manuals and reducing the number of pages. Even if, from an IT perspective the steps are still there, from a process point of view, make it simpler to explain how and why you as an end-user need to do this specific task in what they do.” (OM)

“If you have a basic campaign it has a very basic creative requirement, it has got a single objective ...but if you have variants like I want to talk to NSW customer and Vic customers, but not the top Australian customers, that adds complexity. If you say I want to contact NSW customers who could take up this offer in week 1 and I want to continue with them in week 3 as well, that adds to the complexity. ...All these different parameters add complexity. We have to engage with the [system specialists] for offer creation and some of these offers creation in the system is complex and sending out the campaign and all the flowchart build, that becomes complex, based on the multiple roles.” (O)

“I would say it is a very complex process. The steps are pretty much the same, but based on the campaign there are many differences in the requirements. It is highly complex.” (O)

6. **Tacit knowledge is important.** Whereas there are a lot of documented processes, much of what determines actual practice is tacit knowledge vested in individuals based on their experience.

“I go back 8 years, everyone knew what to do, because they were all ‘inbred’. The process documentation was woeful, but it worked.” (OM)

“It’s fair to say some people follow process really well and other go, well, I been doing it this way for 25 years it will be fine.” (OM)

“There’s still fair amount of knowledge that exists in individuals who been around for – I’ve been doing this for over 15 years, I’ve been in the office for over 10. That kind of level of knowledge and experience, you can’t really train.” (OM)

- 7. The need for scalability.** SupaMart is a large business that comprises many parts. Growth and agility requirements create a need for scalable resourcing solutions. The use of external suppliers has been one way to create flexibility and scalability of some functions. In some cases, the supplier has not been able to keep pace with the change in demand.

“It’s not so much complexity as scale. The business is very large with lots of components, but it’s not rocket science.” (E)

“So the original [out]sourcing agreement was, if you like, successful to achieve our scale. What we’re finding is we’re starting to reach those thresholds again now, and it’s difficult. We’re now in a situation with our incumbent, where they’re more like [internal] IT. They’re actually not innovating their processes, people and tools in line with what we need, moving forward.” (OM)

“We’re finding [the marketing agency contractor] is quite resource constrained, when the intent with going to a 3rd party was to have flexible resources on demand. So, they’re not scaling their people appropriately. So in essence, we end up with the same constraints, potentially – it’s got us to a point – but now we need a step-change.” (OM)

Process Flexibility

- 8. Agility through third party suppliers.** Responding to the dynamics of the business environment has required SupaMart to augment its internal capabilities either because these capabilities are under resourced internally, or else do not exist at all. Third party suppliers

and partners have been engaged to fill this need. Examples include niche IT product vendors, business consultants and business process outsourcers such as a marketing agency.

“So it still makes sense to look for a partner to do this - we’re high change, driving high volumes and wanting to do different things so it’s a constant change environment.” (OM)

“[The reason for going to an external supplier is] speed and cost. And bureaucracy. So being someone else’s priority. If you’re a business person trying to get on with something, to be in a queue or a line around an IT team’s varied priorities. And a contact centre in retail organisation isn’t priority number one, and we get that.” (OM)

“Organisationally [internal] IT is structured to deal with large scale major program initiatives. They’re really “stay in business”. It doesn’t have ...there’s no consulting arm. So, for me when I look at what I do today, the people, the processes, the tools; digital is the essence of everything that I need to do. There’s a massive opportunity there around different software changes, innovation. I don’t have anyone to talk to, anyone who can guide me on any of those things. I need to go and source those myself from the market – to go and talk to other companies, go through other organisations, go to conferences or reach out to vendors directly” (OM)

9. **Balancing formality with pragmatism.** Large parts of SupaMart’s business are defined by detailed procedures, particularly when it comes to complying with food safety regulations.

“If you were to take a number of our process documents, especially if they relate to promotions, to price, that kind of thing, there’s callouts and references to ACCC, to legislation, to trade practices act and so forth. You have to do this because it’s the law, I don’t really care if you like it or not, it is the law. If the law is 100%, we will achieve 120%.” (OM)

However, there is a recognition of the human element determining how the process is actually practiced, taking in account how people are motivated to “do the right thing”.

“There is a balance: ‘wellness versus willingness’. In other words, the balance between having formal processes and compliance and something that’s pragmatic and achievable. There are large parts of the business that are process-driven.” (E)

“So my biggest learning is the superficial process isn’t necessarily followed, it isn’t necessarily documented as well as it should be and the control points are more based on people rather than process. And they’re circumvented because of this desire to meet this need of a particular date.” (OM)

“We’ve reached a certain point of scale and demand, there are a few quality issues appearing that need to be dealt with. So, we’re going through a bit of a cultural revolution at the moment around appropriate processes and how you follow them.” (OM)

- 10. Human judgement is part of process.** It is not possible to codify all aspect of the business. There remain operations level tasks, such as in the contact centre or a store, that require human judgement to be exercised on a case-by-case basis.

“You have to go, like an issue with milk, versus an issue with some other product. They don’t equal each other. How much milk do we sell, if anything minor is wrong with milk, we need to be on it. So, that’s where the human bit of the process is important.” (OM)

“There’s a skill around dealing with, firstly the emotion of some of that with the customers and so that you don’t escalate things unnecessarily or cry wolf to the business, it’s a bit of a skill around that incident management. So, we’ve actually established more of a triage function where if I’m at the front line, I pass it to somebody, a more experienced team and because this is 7 days a week, varied hours, and that team has processes to escalate and engage into the business.” (OM)

“There are so many variations of a procedure, that it’s just...and it becomes too robotic, too rigid, the customers see though it very quickly, you don’t get a great experience. So, it’s that balance between here are the musts and here are the core pieces of the process, how

you manage in between can vary based on the business, the contact, you know, how the contact goes.” (OM)

- 11. Multi skilled teams give flexibility.** At an operational level, SupaMart has evolved multi-skilled teams. In particular, the more sophisticated customer-centric services delivered through the contact centre have required a corresponding depth of skill and expertise on the part of the contact centre operations staff to enable them to be responsive in real time. In other parts of the business more traditionally associated with simple procedural work (e.g. within stores), cross-skilling staff has improved flexibility as well as staff morale and motivation.

“The ability to do cross-skilling, it’s a combination. So, you’ll have some people who are able to have that skill across all [customer] channels. The younger people tend to be able to swing across the different channels. It’s a very different skill to be able to control that conversation in a web chat space versus a phone space. And this is a rapid change that is happening today” (OM)

“I’d say 50% of my staff use [this IT system] as much as I do. The same systems, because they’ve all been trained in the systems and that gives me flexibility.” (O)

“I’ve got a good team, they’re all flexible and show initiative to try different things. They all like working outside of their key departments, so we work cross-departments, so I’ve got people who do ordering for us, do quality, do POS, whatever.” (O)

- 12. New processes are designed.** The organisation recognises the need to periodically transform its business by deliberate design intervention. An example is the transition to the multi-channel model of customer engagement where the contact centre is delivering new products and services across new customer channels. In doing this, it has had to adapt its existing processes, IT systems and engage with other parts of the organisation to develop new capability.

“So we’re recognising from a customer journey, you can’t have marketing people doing this over here and the contact centre responding over here. We need to actually bring that together. So,

we're launching those capabilities around natural language search, so that if you do a search and look for information, by the time that you do get into webchat you can see that, so you don't have to start again and explain information about this or I had this problem, we can actually see that because you've already started that journey." (OM)

"The systems we're putting in place will allow us to go, look here's a trending issue and the customers aren't happy with how we're responding to that or on the information on that. So, that is the loop, it's a sort of a business partnership as well as contact centre. So, we go: do we have an opportunity? What do we need to do, add more information, do we change our offer, do we respond differently, do we do this..."? (OM)

- 13. Processes are improvised by individuals.** At both the individual level and operations management level there are instances of processes being adapted to circumstances to achieved the perceived necessary outcome for the business.

"There were lots of different ways to skin the cat, sort of where you're at, and if I had been around a long time, I knew them all." (OM)

"So what we're doing to circumvent the [constraints of the] processes are becoming extremely flexible in our timelines. So in essence the agility is around people probably working longer hours, taking short cuts in the process, circumventing some of the work flows or tools that have been put in place, by phone calls or communications. To get things out the door on that right time." (OM)

"But if I'm an old soul, I knew how to get around everything, in order to meet whatever I needed to meet." (OM).

Technology Constraints

- 14. Barriers to using internal IT department.** Internal IT's strategy has been to focus on the provision of standard core systems that in many cases have not met the business units' needs for richer functionality, encouraging them to find their own workarounds.

“We haven’t really applied any flexibility to have a different operating model around our systems of engagement – so our online systems, our mobile applications, our apps, etc. What that has led to is the business taking initiatives that has effectively created a lot of replication and complexity as well as things like core dependencies on small external organisations, lack of retention of IP and things like that.” (CIO)

Other motivators for bypassing internal IT have been the latter’s limited ability to respond in required timeframes, the lack of a particular expertise and the cost when compared to external niche IT providers.

“Also the perception of IT always being too slow to respond to business needs” (CIO)

“The biggest sort of barrier from a business perspective, if I want anything done by IT I have to pay for it. It doesn’t matter what the extent of the application is, like anything I have to raise a business case and raise funds. It could very well cost me \$100K to do this or more depending on what needs to be done. I’m never going to be able to achieve a business case to say put it centrally. It’s never going to be worth \$100K to do it. That’s why we never go to IT and ask them. I don’t even waste their time.” (OM)

“[My situation is] not just IT “keep the lights on” – they’ve put it in and it will just tick over, operationally. It’s high change because it’s marketing –so the underlying data needs to change constantly, if you want to put a different lens on it around more precise kind of targeted marketing. So, you need an IT shop that can actually support a high change area. In addition, they need expertise – not only around data, they need expertise of the actual software itself because you’ve got to run these things on a nightly basis, or multiple times a day to drive these campaigns through the sausage factory.” (OM)

- 15. Disconnect between Business and IT Strategy.** There is a lack of business input into the IT strategy and a disconnect in how the IT strategy is being communicated back out to the business. The perception is that IT is taking a “keep the lights on” approach focussed on

basic systems provisioning, with the business essentially having to adapt to new IT system rollouts rather than taking a more pro-active role in their design.

“I would say there’s not a close alignment, the partnership between IT and business and where we need to take that into the future.” (OM)

“Consulted [about the IT strategy], probably no. Have I seen it, yes. I was more sort of taken through it once they had worked it out.” (OM)

“Someone’s going, we want to use Salesforce, let’s do an RFP to get an outcome. And I’m thinking, well if there an RFP you should be driving that from a [business] group direction and going: ‘As an organisation, our recommended case management system is X or Y.’ But what I find is that because IT don’t have the money, they don’t champion and own those decisions, so they end up buckling to that one business unit [laughs] at that one point in time, because they go, well it’s our money, we’re going to go and do what we want to do.” (OM)

“Sometimes there are misalignments that involve the business strategy for a particular quarter and what the IT team is delivering in that particular quarter.” (O)

“No we’re on the receiving end of [the IT strategy]. What we are as a business unit is making sure that any, any application that we do change or adjust, suits our business, and we’ll sort of guide them on a day-to-day level to make sure that anything they do benefits store teams. (OM)

“I’m ex-IT as well. So, I’ve been in this current role for about 10 months. I would say visibility [of the IT strategy] isn’t there.” (OM)

“That’s an unfortunate thing. For the last 9-10 months, ever since our team was formed, we have been trying to get visibility of the IT plans, their strategy, and trying to align them with ours. But unfortunately, it has not happened.” (O)

- 16. IT not aligned to changing business needs.** Rapidly changing parts of the business such as the new products and services offered through the contact centre, are not well served by

the core IT systems that were not designed to support these functions and have not kept pace with changing needs.

“From a bricks and mortar and retail perspective, all of that systems structure and Information is about buying and replenishment, it’s not about service and information” (OM)

“The systems aren’t fully populated with all of [the relevant] information, that’s not their original intent. Their intent was to buy and populate our 800 stores nationally, make sure product is there and on time. So, that’s been a big challenge not only to have the [contact centre] agent navigating across all of those systems, but teaching them to be good at it and on-boarding the agent and training them for them to know, where do I go – for this type of call I go to this system.” (OM)

“To be really able to detach yourself from an office, or a desktop and be able to do everything on the shop floor would save a lot of time and a lot of money in the business. To be able to transmit an order from a tablet or an RF unit could make a big difference, at the moment the system won’t support that.” (O)

- 17. IT systems defining the process.** SupaMart is going through a major transformation of their core retail system by rolling out SAP into their general merchandising line of business. They have adopted an “out of the box” with minimum customisation approach, which has required the business to adapt their processes to the SAP model.

“The business is now coming to terms with going, ‘but my order didn’t go out’. Your order didn’t go out because you didn’t do X, Y and Z. But I don’t want to do X, Y and Z – and I go, SAP doesn’t care, it wants you to do it now and if you don’t do it your order won’t go out. But... no buts.” (OM)

“The current answer is no [you cannot deviate from SAP]. But I know there are some areas where we’ll have to be a little bit different. But right now, we cannot be. So right now, we’re asking them to adapt. We’re having a bit of tears.” (OM)

In the contact centre, the availability of information to the operator from a set of IT systems is a determinant of what the operator can do to deal with a customer issue in real time.

“The systems drive the [the contact centre] process in a lot of ways. So, that’s the piece that we support and we also work between the business and [the call centre service provider] to be clear on what the requirements are and what we need to do and understand the intricacies around the process.” (OM)

- 18. Systems are hard to understand, not intuitive.** Business users have found some IT systems difficult to use or understand, creating the perception (at least) that these systems do not provide the functionality the user needs.

“There was not enough knowledge of what the core system was able to do.” (E)

“I don’t think SAP’s known for its usability, so there’s your answer. But we have done a lot of good training around everything we could in SAP, to make it as usable as possible, and get the processes right to make it just flow as possible.” (OM)

“Well we have got a robust solution in place, the trouble is no one uses it – they don’t have the knowledge or they find that it’s not user friendly or they find that it’s not applicable in all cases.” (O)

Technology Workarounds

- 19.** IT tools are improvised when needed. Faced with either business process or technology constraints listed above, there is motivation for the operational areas of the business to create their own IT solutions. These systems are “improvised” in the sense that they are not necessarily consistent with SupaMart’s corporate IT strategy and do not fall under the governance of internal IT. These solutions can exist at an individual level where they are commonly manifested as spreadsheets that fill a particular data management or reporting need. They can also exist at a departmental level, where an operations manager has decided to either develop in-house, or engage a third-party supplier to develop, their own niche system that is fit for their specific purpose. Modern self-service cloud solutions, such as Google Apps, have created an added opportunity for these “cottage industries” to emerge. Over time, these systems become business asusual.

“So we have created another workflow management, that’s done out of Google sheets.” (O)

“I would be very surprised if the CIO understood the extent there are these little MS Access databases and Excel spreadsheets with very complex macros, that actually run our business.” (OM)

“We’re doing it ourselves. We’re doing it with a partner, another IT company. I’m a business person, we’ve got [IT provider] who are basically building this in the cloud. Where my relationships with [SupaMart] IT come into play is the connectivity back in to our systems.” (OM)

- 20. Improvised tools create agility.** From the business’s point of view, the improvised IT solutions are created for expediency and in the absence of an officially sanctioned alternative. The retail marketplace is dynamic and in order for the business to remain agile and responsive, IT solutions need to be developed and deployed quickly. The business has found these improvised IT solutions to be an important ingredient of this agility.

“I know in our replenishment space, there’s a number of similar Access databases that have been created by users for similar reasons. Probably the number one driver of why these exist is the speed at which retail moves” (OM)

“We don’t have 6 months to wait for an application to be built. It’s not big enough a need to justify to the time expenditure and it’s certainly not a big enough need to justify the cost. So, it is very fast, I need it now, I need it within an hour. I don’t have time to engage a project manager, put a resource team together to build it, deliver it and then develop a support plan.” (OM)

“I think it’s always been there and it always will be in retail. We always have to move. It’s insane the speed that we have to be able to deliver stuff at. It is certainly providing top level tools to make it easier.” (OM)

“[The reason for going to an external supplier] is speed and cost.” (OM)

7.4 *Theoretical Development*

7.4.1 Application of the Framework

This section discusses the empirical findings described in the previous section in terms of the Framework and discusses the implications for the evolving theoretical model.

As before, the approach being followed is a build-evaluate cycle which simultaneously tests the Framework's conceptual model and enhances it with either new candidate constructs or a refinement of the definitions of the existing ones. Together with this evolution of the conceptual model is a developing view of the *behavioural* aspects of the organisation as it is conceptualised by the Framework. The characterisation of this emergent behaviour as a function of the conceptual model will be further pursued and described in Chapter 9.

We proceed by mapping the empirically derived themes into the conceptual model and then review the model in terms of its adequacy in representing empirical data and what insights it offers in terms of explanation. Figure 14 graphically identifies where the themes fit in terms of the Framework. Table 18 that follows explains these mappings in more detail.

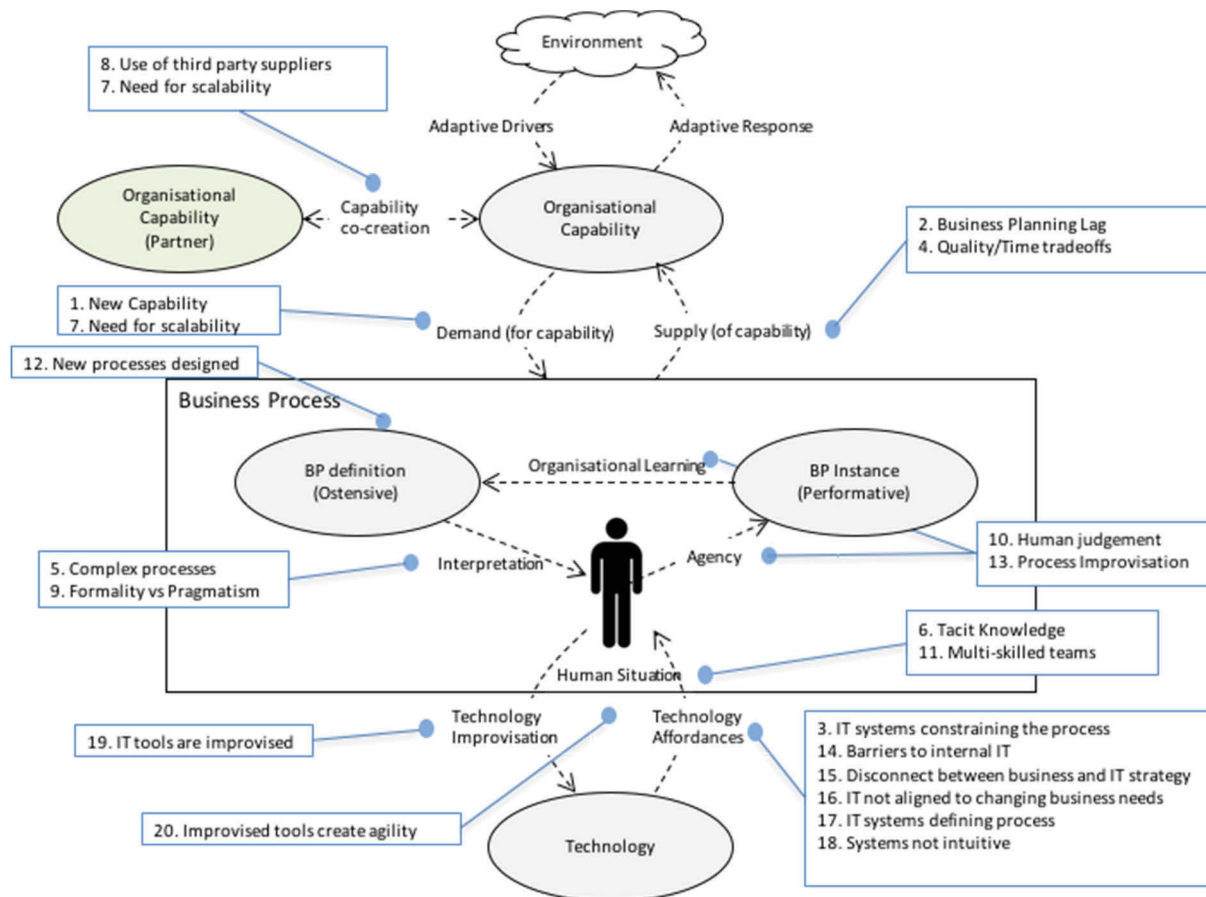


Figure 14 – SupaMart: themes mapped to Framework conceptual model

Table 18 – SupaMart theme mapping

Framework Construct	Mapped Themes	Interpretation
Human Situation	6. Tacit Knowledge 11. Multi-skilled teams	The Framework recognises that contextual elements govern the way the <i>human actor</i> interacts with the other process and technology elements. The themes mapped here are part of that context. In the SupaMart case study, the focus was on staff in operational roles such as store manager, call centre operator or marketing campaign manager. The empirical data supports the idea of tacit knowledge being acquired from experience built up by the individual over time. Specific training can also contribute. This tacit knowledge by its nature is not explicitly represented but is nevertheless a determinant in how an individual understands what they are supposed to do in the context of a particular business process, which in turn will lead to what action they will take as a response.
Capability demand	1. New capability 7. Need for scalability	In its fast-moving competitive environment, SupaMart is faced with pressures to adapt and create new value propositions for the marketplace. In the Framework, this is modelled as a need to create and deploy new organisational capabilities. New capabilities are accomplished by the orchestration or re-configuration of the firm's resources in terms of business processes, people and technology. In SupaMart, we see several examples of changes to these resource elements. The pre-paid phone offer is a new product for SupaMart and creates

Framework Construct	Mapped Themes	Interpretation
		competitive advantage by challenge existing players in what is new business for the organisation. This offering is created largely out of leveraging existing organisational capabilities - namely selling consumer goods to end-users – which is bread and butter business for a retailer such as SupaMart. On the other hand, the initiative to move to a customer-centric, multi-channel, business is one that requires substantially more transformation for the organisation and gives rise to new organisational capability that may be leveraged for competitive advantage. The scalability theme (7) has two components, the first is related to how SupaMart designs its overall operating model to accommodate its component brands that each operate in different market segments, are at different stages of maturity and are growing at different rates. Common shared services, such as the supply chain and core IT systems, have needed to adapt to be able to support the dynamics of this operating model and achieve the appropriate economies of scale. The second aspect of scalability is at a finer grained level, where a business unit achieves flexibility by being able to scale its capability, typically through an arrangement with a third-party organisation (refer to <i>Capability Co-creation</i> below).
Ostensive Business Process	12. New processes are designed	SupaMart’s program to transform its business to adopt a digitized, customer-centric focus is an example where management is intentionally designing a future operating model in terms of business processes and technology. This is evident in the new way the Contact Centre will interact with the Marketing department such that a single view of the customer, and the state of the customer interaction, is maintained seamlessly across the business. A component of this will also be a raft of new enabling technology. In the Framework, an intentional process design activity operates on the <i>ostensive</i> aspect of the business process. Since the latter is defined as what the process is generally understood to be, the implication is that the process design must also include the organisational change management, the training and socialisation to ensure it becomes embedded in the ostensive form. Further, this is at a <i>point in time</i> only. Once deployed (e.g. the transformation project ‘goes live’), the newly designed process will immediately enter the evolutionary cycle that follows the interpretation-agency-organisational learning loop indicated on the diagram, thus causing its “understood” definition (i.e. the ostensive BP) to “drift”, potentially away from its originally designed intent.
Interpretation	5. Complex processes 9. Formality vs Pragmatism	SupaMart places an emphasis on process as a basis for proceduralising work practices and to gain quality and efficiency in its business operations. Across the breadth of the business there are clearly defined processes, some of which a very carefully monitored (such as those that with health or safety implications). SupaMart’s business processes are human-centric and hence are key for defining job roles and staff training. The comment was made that the company is process-driven, but at the same time there was a recognition that there is a large human element involved in how processes are interpreted in a given context and therefore in what actually happens in practice. In the framework, the <i>interpretation</i> of the ostensive business process is a construct that is equated with how the human actor understands what they are supposed to be doing in the operational business setting. This interpretation has several components. Firstly, the attributes of the business process itself such as its complexity, the number of activities, number of hand-offs and so forth. Secondly, the skills and motivation of the human actor involved, and thirdly, the

Framework Construct	Mapped Themes	Interpretation
		other contextualising factors such as what else is happening at the same time, or the urgency attached to the current task by management. That people take specific actions that are independent of, or in contravention of, the process-as-defined to achieve what they perceive is the “right” outcome, was clearly borne out in the SupaMart case.
Technology Affordances	3. IT systems constraining the process 14. Barriers to internal IT 15. Disconnect between business and IT strategy 16. IT not aligned to changing business needs 17. IT systems defining the process 18. IT systems not intuitive	The mapping of these case study themes to the <i>technology affordance</i> construct shows the existence of a variety of factors that influence the use of technology to enable the business process. Recall that the concept of a technology affordance is associated with the IT user’s perception of the usefulness of the IT system functionality for the task at hand, as defined by their interpretation of the ostensive business process. The mapped themes all point to this perceptive dimension, in other words, they all contain an implicit judgement on the part of the IT user regarding the degree of “fit” of the IT system functionality to their intended task. In the simplest case, the IT system presents as being non-intuitive to the user thus creating a usage barrier. In a more complex case, the IT system places a constraint on what the user is allowed to do. In the case of the new SAP rollout, the new functionality was often at odds with the intention of the users, but they were “forced” to use it anyway, resulting in non-compliances and requiring management intervention. In a further case, the IT systems simply did not fit the business need as they had not been developed in line with changing business requirements. Theme 14 provides a more strategic view of technology affordances. It concerns how a business unit sources IT solutions to meet its needs. From the perspective of an operational business unit, the internal IT function represents one of many possible suppliers of IT systems solutions. From the perspective of the internal IT department (as articulated by the CIO), there is an imperative to provide general purpose flexible solutions that leverage economies of scale across the business, but to leave niche customer-specific solution up to the individual business units. The perception that internal IT is too expensive or cannot respond in the required timeframe is consistent with the strategic view of IT expressed in terms of this shared services model.
Technology Improvisation	19. IT tools are improvised 20. Improvised tools create agility	The <i>technology improvisation</i> construct represents where a point IT solution is created to suit a particular user context. At SupaMart these commonly take the form of spreadsheets that are created to augment or add to existing IT systems functionality. In these cases, it was evident that the IT user, motivated by a need to get the job done, took steps to work around the deficiencies in the existing technology affordances. A second motivation was also apparent: the need to solve a business problem <i>quickly</i>. So, as well as working around the functional deficiencies of the current IT systems, there was the perception that improvised IT solutions were a way of responding quickly to a business imperative, or in other words, providing agility to the business.
Agency	10. Human Judgement 13. Process Improvisation	In the Framework, the <i>agency</i> construct, together with the <i>performative business process</i>, represent the action the actor takes as an outcome of the previously discussed factors: their skill and tacit knowledge; their interpretation of the ostensive business process; and, the technology affordances available to them. The agency is what creates an instance of the performative business process - what actually happens in practice. In line with the theory of organisational routines (Pentland et al. 2012), “business-as-usual” emerges and evolves as a consequence of the continuous practice of a business process as a

Framework Construct	Mapped Themes	Interpretation
		result of the human agency described, coupled with the <i>organisational learning</i> feedback loop that merges practice with the history of what has occurred in the past, thereby revising the <i>ostensive business process</i>. At SupaMart, management expressed a view that, despite the process-centricity of the business, a pragmatic balance could be, and is, struck between the formality of a defined business process and the need to achieve a business outcome. An example of this was cutting corners to get a new marketing campaign out on time, by short circuiting the approval process. A question that arises here is whether this type of “judgement call”, that essentially allows (or requires) the actors to deviate from the ostensive business process, and thereby exercise “BP improvisation”, is contingent on some aspect of the business, such as for example the type of business process, organisational capability, or participant involved.
Capability Supply	2. Business Planning Lag 4. Quality/Time tradeoffs	Themes 2, and 4 incorporate the idea of strategic versus tactical timeframes in which SupaMart responds to an external requirement emanating from the marketplace. In particular, they refer to the trade-offs that occur in dealing with these two timeframes, in terms of either the quality of the outcome or the speed of response required. In the Framework, these represent instances of a disconnect between the required capability and what is actually delivered by the business-processes-as-practiced. This misalignment may be either due to the evolution of the business processes away from their designed intent, as discussed above; or, a misalignment of the process-as-designed in the first place. This second aspect invokes the requirement of a second order process that ensures the process-as-designed meets the strategic intent of the organisation, in terms of the required organisational capabilities. The theory of dynamic capabilities (Teece et al. 1997; Teece 2007; Schreyogg & Kliesch-Eberl 2007) is helpful here and represents an avenue with which to further develop the Framework model. This is discussed further in section 7.4.2 below.
Capability co-creation	8. Use of 3 rd party suppliers 7. Need for Scalability	The capabilities that SupaMart deploys into its marketplace are frequently co-created with third party organisations. Examples of this are the use of the marketing agency as the distributor of email marketing campaigns, or the use of an outsourcer for the customer contact centre. In this cases there is more than a simple supply chain relationship: often the overall business process spans the third party such that the overall capability outcome is created out of an orchestration of both parties in the process. For these examples, the relationships between the parties were tightly coupled in the sense that the business process, data and technology were all specifically designed to support the interaction. As noted by the operations management at SupaMart, one of the main reasons for the use of these partner organisations is their ability to scale up (and down) an appropriately skilled workforce as the transient needs arise. This was evident in both the contact centre and marketing campaign areas of the business.

7.4.2 Insights for Organisational Agility

Dynamic Capabilities

Core to the research project is the investigation into organisational agility. The Framework is an artefact being designed with the objective of providing a theoretical lens on the organisational

building blocks that are implicated in providing or denying this agility. It is clear from the preceding discussion that SupaMart case study suggests some areas for further elucidation of mechanisms at play. One of these goes to the heart of what agility means: the ability to respond in a *timely* manner to change. We see at SupaMart instances where: the timeliness of response is important (as in the launching on marketing campaigns); where too much focus on speed creates quality issues; and where lag in response in one part of the organisation gives rise to workarounds in another part.

The theory of dynamic capabilities (DC) (Teece et al. 1997) provides a well-established basis for understanding how organisations modify their resource base in response to the environmental drivers such as market demand. DCs can be thought of as second order capabilities that operate on the organisational resources to extend or augment the first order organisational capabilities (being the core business of the organisation) such that they meet the imperatives of the market, for instance. Teece (2007) characterises several component capacities of DCs. Simply put, these are the sensing and shaping of opportunities; seizing opportunities, which can be equated to strategic decision making; and then the orchestration of the “assets” - or in other words the resources, the people, processes and technology - to achieve the strategic intent.

Figure 15 depicts the essential adaptive aspects of the Framework. Following Teece’s (2007) typology, DCs are shown in relation to Framework constructs they operate on. At (1), the organisation is *sensing* the changes and demands of the environment and *shaping* them in terms of whether and how they are important to the organisation. This function is what determines the imperative for the organisation to adapt. At (2), strategic decision making by the executive *seizes* an opportunity by determining which organisational capabilities will be required and how they will be sourced, whether internally or through partnerships or acquisitions. The role of management in this fashion has also been highlighted in recent DC research, for example in understanding the cognitive skills required (Teece 2016) and cognition as a dynamic managerial capability (Eggers & Kaplan 2013). At (3) the *orchestration* of the resource base is represented in terms of how the business processes will be designed, extended or reconfigured to deliver these strategically aligned capabilities. Finally, at (4), a further DC capacity is shown, that is, a *monitoring* function. This is the second-order regulation capability that is suggested by the idea of the “learning organisation” (Morgan 1997). Similarly, Schreyogg and Kliesch-Eberl (2007) have suggested a capability monitoring function as a second order dynamic capability, that ensures the ongoing fit of the organisational capabilities with the changes in the environment. In Teece’s typology (2007) this DC would be included in the more general orchestration capacity. In terms of the Framework, the monitoring function has a role in assessing the alignment gap that exists between the strategically aligned

organisational capabilities required to address the external demand and the current capabilities of the organisation.

As indicated in the diagram, these DC capacities have natural loci in the Framework conceptual model, and therefore give rise to an opportunity for further enrichment of the model. Table 19 provides some examples of these types of DC and illustrates with instances from the SupaMart.

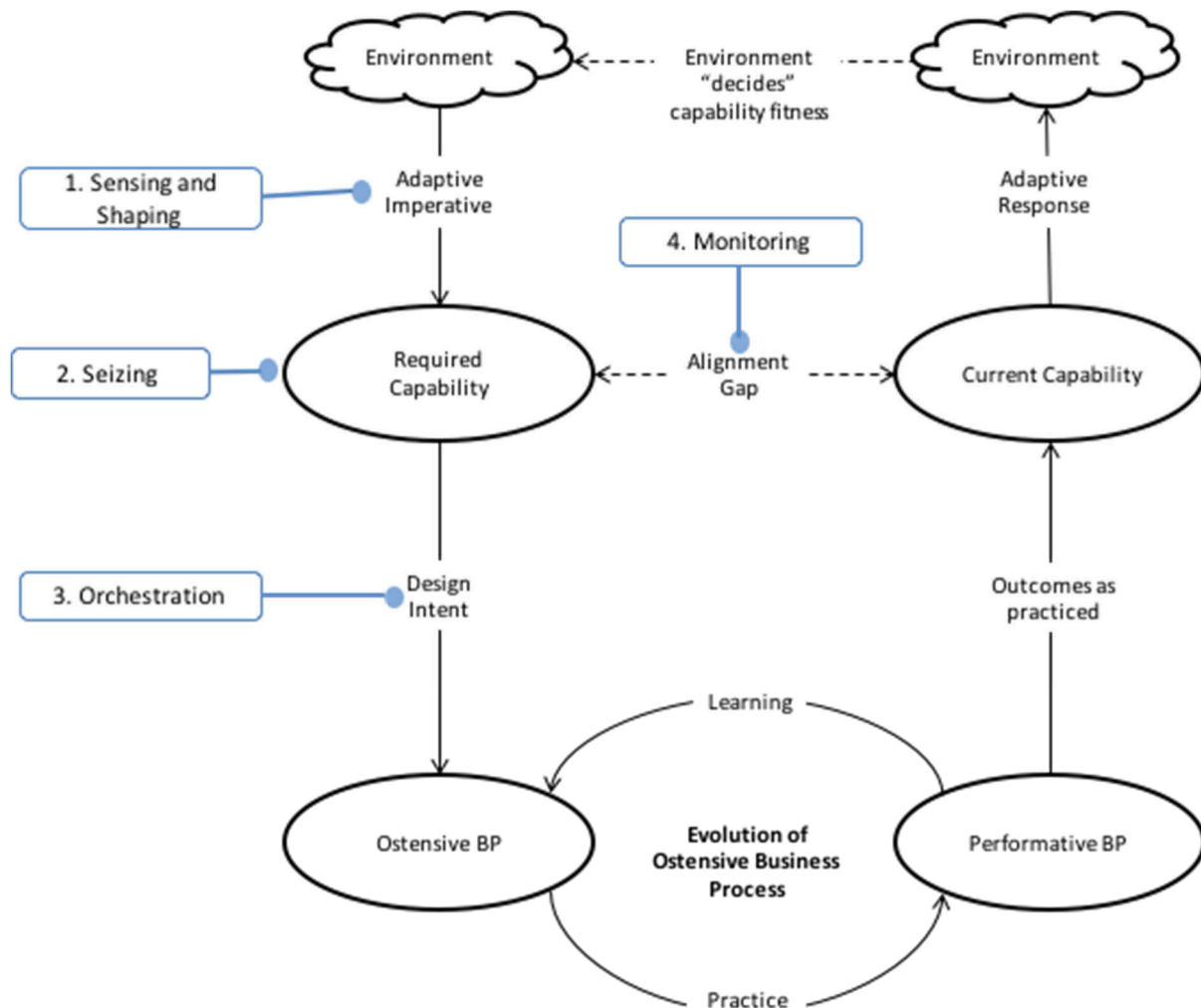


Figure 15 – Role of Dynamic Capabilities

Table 19 – Examples of Dynamic Capabilities in the Case Studies

Area of Dynamic Capability	Typical Management Activities	Examples from Case Studies
Sensing and Shaping	- Market scan - Research and Development - Competitor analysis	- Customer satisfaction surveys - Customer feedback from contact centre - Customer analytics
Seizing	Business Strategic Planning	- Digitization (multi-channel) strategy - Customer-centric business strategy

	• Formation of partnerships and alliances • Defining value propositions	• Supplier partnerships
Orchestrating	• Business Transformation initiatives • Lean/Six Sigma initiatives • Training	• Supply chain re-engineering • In-store customer experience design • Convenience stores as a new business model
Monitoring	• Governance and Compliance • Operations Management	• Internal Audit

Capability Co-creation

Tight coupling between organisations affects flexibility because of the constraints operating on being able to reconfigure inter-dependent resources (Sahaym et al. 2007). In terms of the Framework, this means that these co-created organisational capabilities are potentially less agile in the situation such as SupaMart's where there is this tightly coupled relationship between the partner organisations.

Compare this with loosely coupled modes of interaction such as those defined in terms of generic services that seek to create more agility by reducing interdependencies. This concept has been explored in the literature in terms of *modular organisations* where flexibility related to the degree of coupling is balanced by synergies that are achievable due the *specificities* of the relationship (Schilling 2000). These synergistic specificities could include things like cultural fit of the organisations and the use of common or integrated technologies.

7.5 Conclusions from the Case Studies

In the manner of a series of scientific experiments, qualitative case study research such as this is designed to arrive at analytic generalisations that offer explanations for phenomena by observing theoretically postulated mechanisms in a real-life context (Yin 2009; Tsang 2014). The case studies presented have provided the opportunity to instantiate and evaluate the theoretical model represented by the Framework in three distinct organisational settings.

The Coleman diagram that corresponds to the Framework's model of causality developed earlier (in Figure 6) is a useful structure with which to consider the common themes that emerge from the case studies. Table 20 summarises these themes and Figure 16 overlays these themes onto the Coleman diagram. They form two groups: the first relates to the observations on the conditions that exist within the organisation (the left-hand side of the Coleman diagram). The second group relates to outcomes observed in the organisation (the right-hand side of the diagram). The following conclusions can be drawn:

- The theoretical constructs may be meaningfully operationalised;

- The Framework's conceptual model may be used to interpret specific organisational contexts in all three case studies;
- Replication across the cases adds to the analytic generalisation (Yin 2009) achieved.

Together this provides the basis of a microfoundational model of agility that will be further discussed in chapter 9.

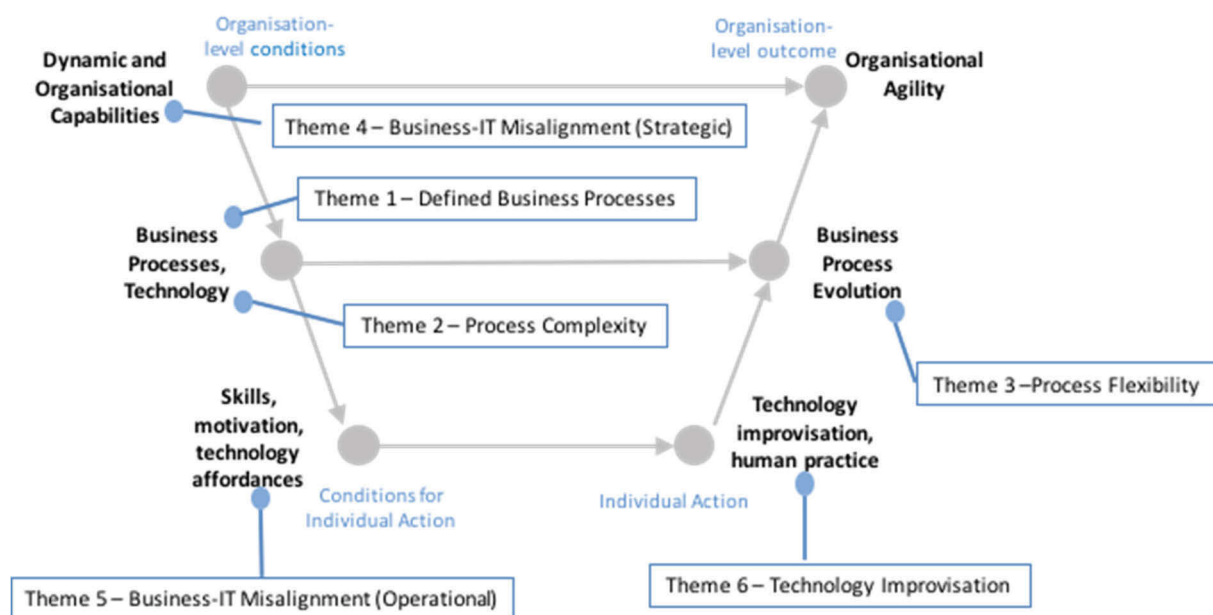


Figure 16 - Common empirical themes mapped to Coleman diagram

Table 20 - Summary of empirical themes across all case studies

Summary Theme	Description of theme	Manifestation in Case Study Organisations		
		ABC	Pharma Inc	SupaMart
1. Defined Business Processes	The extent to which practices within the organisation are codified and enforced.	Little explicit process codification, but a general understanding of “this is the way we do things” was present.	A strong culture of standard operating procedures (SOP) that govern the conduct of core business processes chiefly from quality and safety perspectives.	Work practices codified at a lower level, typically to ensure repeatability, efficiency and safety across a large workforce.
2. Process Complexity	The perception of the complexity of the business process in terms of number of steps, number of participants or associated business rules.	Perception by operations staff of unnecessary complexity of core processes, attributed to offshoring of functions and numbers of organisational participants.	Processes perceived as complex in terms of number of steps and in understanding what is required to complete each step. This can be confusing for all but highly experienced staff.	Recognition that the rote procedures of the past were heavy in terms of the number of steps, and from the perception of the staff member, hard to understand why they were doing it that way. Initiatives underway to attempt to simplify processes.
3. Process Flexibility	Flexibility in business processes manifested as a) a balance between formality and pragmatism in how they are practiced, or b) improvisation by individuals in response to perceived constraints.	Operations staff take it upon themselves to work around perceived roadblocks in processes.	Workaround processes have emerged to compensate for local operating requirements being different from global standards emanating from head office. There is room for judgement to be exercised by individuals.	Well-worn practices have evolved emanating from experience individuals who “know the system” and how to work around the perceived constraints.
4. Business-IT misalignment (Strategic)	The perception on the part of the business is that the IT strategy, if it exists, is not well communicated or is simply out of alignment with the need.	Even though ABC is a leading IT services provider, its own internal IT strategy is poorly articulated and the connection with the business strategy is weak.	IT is regarded as a back-office function rather than as a strategic business enabler. The centralised IT operation is focussed on providing commodity IT systems to the business.	There is little business-IT collaboration on strategic direction. The central IT function is pursuing a consolidation and efficiency agenda. The business units have the freedom to engage IT suppliers for their own niche solutions which don’t necessarily

Summary Theme	Description of theme	Manifestation in Case Study Organisations		
		ABC	Pharma Inc	SupaMart
				fit the corporate IT strategic direction.
5. Business-IT misalignment (Operational)	IT systems are perceived to either not have the required functionality or to have been poorly deployed into the business.	Corporate supplied IT systems are widely regarded as inadequate either in terms of functionality or in how they have been deployed.	“Vanilla” systems supplied by central IT function are not well aligned to the needs of local operations. Organisationally it has been difficult to support the remote operating companies such as Pharma Inc in Australia.	New corporate systems have been poorly deployed leading to a lack of user uptake.
6. Technology Improvisation	The manifestation of improvised IT solutions by a business user, motivated by the perception that the available IT systems are inadequate for the task at hand.	Local operating company institutionalises the use of locally developed spreadsheets to work around global system deficiencies: e.g. labour forecasting	In response to perceived local needs, improvised spreadsheets have emerged and become part of normal practice.	“Cottage industries” developing local IT solutions have emerged within business units, based on the premise that their needs are special. Central IT have accepted this reality and moved to provide backend supporting services such as systems of record.

7.6 Summary

This chapter has presented the final of three empirical case studies designed to validate and enhance the developing Framework. It has also drawn together the conclusions from all three case studies that have formed the empirical part of this research project.

The following has been highlighted

- The subject of the case study, a large Australian retail company, fulfils the requirements to be included in the research project. It exists in a dynamic, commercial environment and is facing tough competition not only from established players but also from new market entrants. Technology play a large role enabling its business.
- The case study has applied a qualitative approach using interviews to gather a rich level of information from the executive level (including the CIO's office) down to the operational level of the business.
- The emergent empirical themes have been mapped and assessed against the Framework's conceptual model in order gauge how the observed phenomena could be understood in terms of the latter.
- The insights that the nascent model offers into organisational agility have been discussed.
- The conclusions from all three case studies have been discussed.

8 Research Publications

8.1 Introduction

This chapter presents the publications that have been produced based on this research project (Crick & Chew 2014b; Crick & Chew 2014a; Crick & Chew 2015a; Crick & Chew 2015b), in the context of the research timeline. The publications and the point in time at which they have been produced have been an important component of the research approach. They have allowed the nascent Framework concepts to be exposed to peer review scrutiny, challenged some of the assumptions made and provided valuable feedback to the researcher.

The final accepted manuscript for each paper can be found in the Appendix.

8.2 Publication Chronology

The progress of the research, measured in terms of the produced publications, transitions through four notional phases as shown by the horizontal boxes in Figure 17. In this diagram, the project's timeline is represented by the chevrons, indicating the core research tasks. The numbered boxes represent the publications that are described below in the context of each phase. The following paragraphs summarise the significance of the publications to the respective phase of the project.

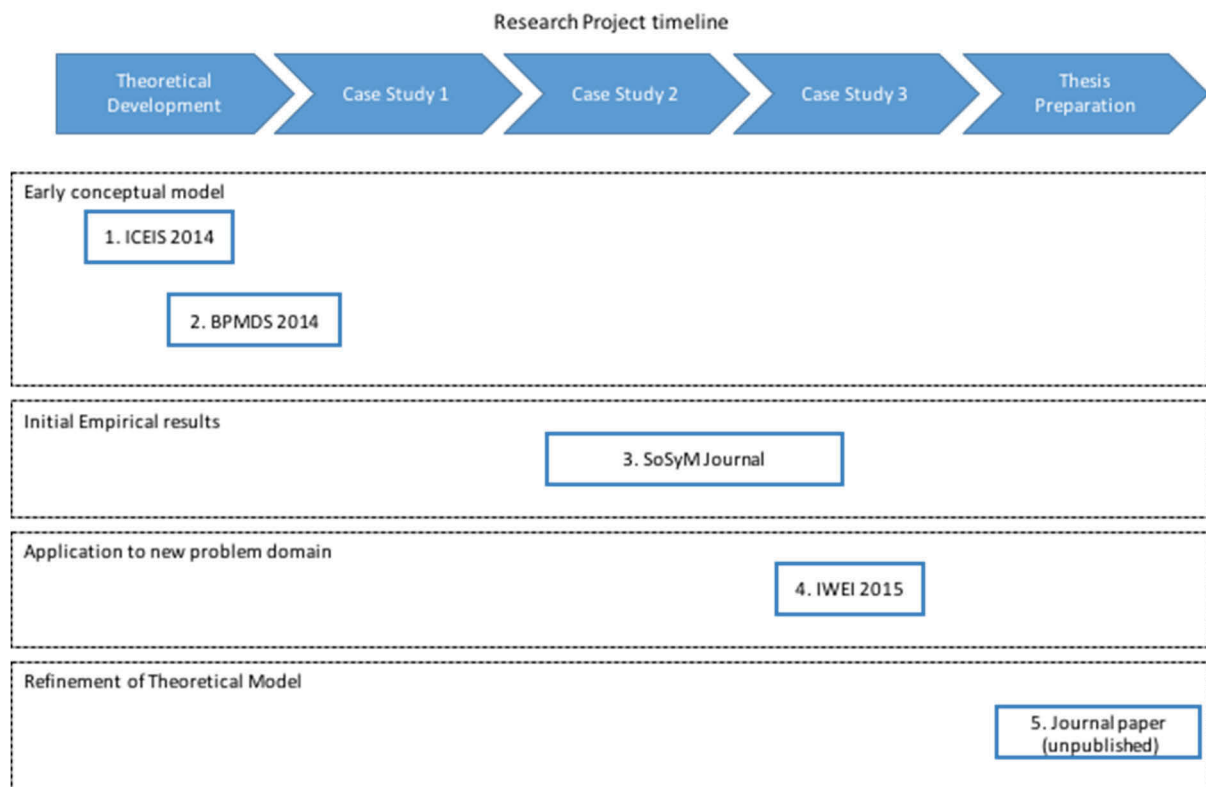


Figure 17 - Publication Chronology

8.2.1 Early Conceptual Model

Two conference papers were presented during the course of the development of the initial conceptual model. The ICEIS paper addressed the broad scope of this research project by positing deficiencies in the extant work and how these could be addressed by the Framework. The BPMDS paper pursued the conceptualisation of business process as a socio-technical object as an additional theoretical lens on human-centric business processes, a view understated in the traditional IS literature.

ICEIS 2014 -16th International Conference on Enterprise Information Systems

Title: Understanding the role of Business – IT Alignment in Organisational Agility

Abstract: Extant research shows business-IT alignment to be both an enabler and inhibitor of overall organisational agility and has pointed to the need for finer grained perspectives to fully elucidate the relationship. This paper posits the view that, firstly, current approaches to reasoning about where rigidities are present that are preventing organisational agility are lacking in both granularity and sound ontology. Secondly, that to obtain the necessary granular view, the socio-technical dimension

of the business-IT relationship must be examined. An initial conceptual model behind ongoing research into this topical problem area is presented.

BPMDS 2014 – Business Process Modeling Development and Support (at CAiSE 2014)

Title: Towards a Consistent Cross-Disciplinary Ontology for Business Process

Abstract: This paper takes a cross-disciplinary view of the ontology of “business process”: how the concept is treated in the IS research literature and how related concepts (with stronger human behavioural orientation) from organisational and management sciences can potentially inform this IS perspective. In particular, is there room for socio-technical concepts such as technology affordance, derived from the constructivist tradition, in improving our understanding of operational business processes? The paper draws on the current research being pursued by the authors in developing a theoretical framework for understanding the role of IT in organisational agility. In this developing theoretical model, we are seeking to include the user-oriented socio-technical dimension that distinguishes the IT “as-used” from the IT “as-designed” in our use of business process as an organisational building block.

8.2.2 Initial Empirical Results

The paper presented at BPMDS was selected for expansion in a subsequent edition of Software and Systems Modelling (SoSyM). This provided the opportunity to introduce the results from the first case study to illustrate the points that had been made in the earlier theoretical paper. As well as providing additional validation for the emerging Framework model, this also allowed scrutiny of the empirical case study methodology.

Software and Systems Modelling (SoSyM journal) 2015

Title: Business Processes in the Agile Organisation: A Socio-Technical Perspective

Abstract: This paper takes a cross-disciplinary view of the ontology of “business process”: how the concept is treated in the IS research literature and how related concepts (with stronger human behavioural orientation) from organisation and management sciences can potentially inform this IS perspective. In particular, is there room for socio-technical concepts such as technology affordance, derived from the constructivist tradition, in improving our understanding of operational business processes, particularly human-centric business processes? The paper presents a theoretical framework for understanding the role of business processes in organisational agility that distinguishes between the process-as-designed and the process-as-practiced. How this practice aspect of business processes also leads to the improvisation of various information technology

enablers, is explored using a socio-technical lens. The posited theoretical framework is illustrated and validated with data drawn from an interpretive empirical case study of a large IT services company. The research suggests that processes within the organisation evolve both by top-down design and by the bottom-up routinization of practice and that the tension between these is driven by the need for flexibility.

8.2.3 Application to New Problem Domain

The IWEI conference provided the opportunity to apply some of the core Framework concepts to the domain of enterprise interoperability (EI). This domain is outside the original scope of the research project, but nevertheless quite relevant in order to further test the developing Framework. The idea of business processes as evolutionary objects was posited and the implications for EI discussed.

IWEI 2015 - 6th International IFIP Working Conference on Enterprise Interoperability

Title: Introducing a socio-technical perspective on business processes into Enterprise Interoperability Frameworks

Abstract: This paper looks at enterprise interoperability (EI), specifically process-level interoperability, and suggests that the inherent non-determinacy of human-centred business processes introduces another ingredient into the EI puzzle that has thus far been understated in EIF ontologies. A conceptualisation of business process based on socio-technical concepts is presented. It is argued that this provides a better way to accommodate human agency factors, and under the influence of these factors, how business processes inevitably evolve over time, potentially affecting their interoperability. We suggest the extant body of knowledge on the theory of dynamic capabilities is relevant to understanding how organisations can control this potentially undirected process evolution and thereby sustain interoperability. Some initial observations are made concerning how this new ontological element could be accommodated into existing EIFs. The paper aims to stimulate discussion in this area and make a contribution to the EI body of knowledge.

8.2.4 Refinement of Theoretical Model

This journal paper develops a novel multi-level microfoundational model of organisational agility based on the theoretical Framework.

Journal Paper (unpublished)

Title: Microfoundations of Organisational Agility: A Socio-Technical Perspective

Abstract: The paper explicates the microfoundations of organisational agility in terms of socio-technical organisational building blocks. Drawing on the theories of organisational capabilities, routines and technology affordances, a theoretical model is developed to provide a conceptual bridge between the exogenous organisational environment that generates a need for change, and the internal organisational “machinery” – the people, the processes and the technology - that must be reconfigured and redirected to achieve the new organisational imperatives. The timeliness of being able to achieve this change and the constraints that operate on it are the essence of agility. The posited theoretical framework is illustrated and evaluated with data drawn from three interpretive empirical case studies, representing three industry sectors. The research suggests that processes within the organisation evolve both by top-down design and by the bottom-up routinization of practice and further the tension between these is driven by the need for flexibility. The paper contributes a novel multi-level microfoundational theory of organisational agility in terms of granular, socio-technical building blocks which specifically recognises the human behavioural role in the macro-level phenomenon of agility. By elucidating microfoundational mechanisms, the theory defines a stronger causality model for the explanation of organizational agility phenomena.

8.3 Summary

This chapter has provided an overview of the five research papers that have been produced from this research project. In summary, these publications have been important ingredient of the overall project:

- They have explored the key aspects of the central research problem, including ontology, granularity and dynamics.
- They have exposed the Framework conceptual model and empirical approach to peer review scrutiny.
- The review and revision process has led to the enhancement of the Framework model.
- Opportunities for further research directions have also emerged from these communications of the research.

9 Discussion

9.1 Introduction

Having established a theoretical model and used empirical data to evaluate and refine it through chapters 4 through 7, this chapter now goes on to discuss the implications of the Framework and how it addresses the research questions posed at the outset. This discussion is in two parts: the first concerns the dynamic behaviour that the Framework's conceptual model implies, leading to insights about organisational agility and the role of technology alignment. The second part of this chapter evaluates the Framework as a theoretical artefact by revisiting the requirements set out in Chapter 4 *Initial Theoretical Development*.

9.2 Microfoundations of Organisational Agility

As has been stated before in this thesis, the conceptual model of the organisation that has been developed is inherently a dynamic one. The model has set out to provide a linkage between micro-level behaviour (such as by the individual in their engagement with technology) and the macro-level behaviour (such as the ability of the organisation to respond to an externally imposed imperative to adapt). The interpretation of the model from a behavioural perspective is now discussed in more detail.

Returning to the Coleman diagram in Figure 6, the three "layers" in the model - being the macro or "capability" level; the meso or "business process" level; and the micro or "individual" level - are now discussed. The dynamic behaviour, implied by the Framework, that arises within and across these layers is described by applying a systems theoretic lens¹⁸.

9.2.1 Capability Level

We start with the organisational capability level. In Figure 18 below, the macro adaptive behaviour of the organisation, where there is a requirement to deploy a new capability in response to a need emanating from the environment, is characterised. The shaded variables indicate those that are exogenous to the organisation, namely the need (e.g. market demand) for a particular organisational capability ("X") and the signal that the demand is saturated. The matching of internal capability to

¹⁸ In this discussion, causal loop diagramming (Senge 1990) is used as the descriptive tool. A guide to this notation is provided in the Appendix for reference.

that required by the environment is the principle behind “evolutionary fitness” (Helfat et al. 2007). Feedback loop (0) shows that evolutionary fitness is a goal that is driven exogenously to the organisation: the market decides which capabilities are required.

The sensing and shaping dynamic capabilities characterised by Teece (2007) can be equated to the management decision making in setting the strategy on how to deal with imperative for action coming from the environment. To do this successfully, the requirement for a new capability must be sensed and the fact that a gap exists in the current ability to deploy such a capability. The classic response is the orchestration or reconfiguration of the resource base – the people, processes and technology – to achieve the organisational capability determined by management’s strategy. There is a goal-directed feedback loop (1) operating, whereby the result of the resource orchestration is the achievement of the capability with a given technical fitness. The important relationship from an agility point of view is the lag (notated by the “|” symbol on the arrow) between sensing the need to deploy new capability and the realisation of that capability.

How this might play out in time is shown in Figure 19. Recall that evolutionary fitness is function of *both* exogenous demand and technical fitness. In this scenario, the organisation’s initial ability (at t_0) to compete by means of capability X, is reflected by the large delta between the exogenous need and evolutionary fitness for that capability. Between t_0 and t_1 , as management decides this represents an opportunity (Teece 2012; Helfat & Martin 2015), the upward curve in technical fitness represents investment in orchestration of resources to achieve the uplift. Starting from a low technical fitness base such as this would represent a significant transformational effort. If the delta was less at this outset, the effort is more akin to incremental or exploitative innovation that would be achieved over a much shorter timeframe. The lag, $t_1 - t_0$, represents the time it takes to create the level of technical fitness that is demanded by the environment, and is measured in term of the evolutionary fitness of X. In parallel, the dynamics of the exogenous environment has changed the demand for this capability (e.g. diminishing it through saturation). The internal/external alignment “sweetspot” – or in other words, the point at which the evolutionary fitness is at its maximum - is therefore potentially a narrow window of opportunity for the organisation to exploit before the value of the capability (its evolutionary fitness) starts to decline. This reflects the essence of the organisation’s agility.

In the sense of the organisation as an adaptive system, delays of this kind can cause oscillatory or even chaotic behaviour (Sterman 2002), as the organisation’s ability to respond gets out of phase with the speed of response required. Examples of this are where organisations invest in lengthy

development efforts for products for which the market demand has since lapsed, or in other words “they’ve missed the boat” (represented in Figure 19 by the gap labelled 3)

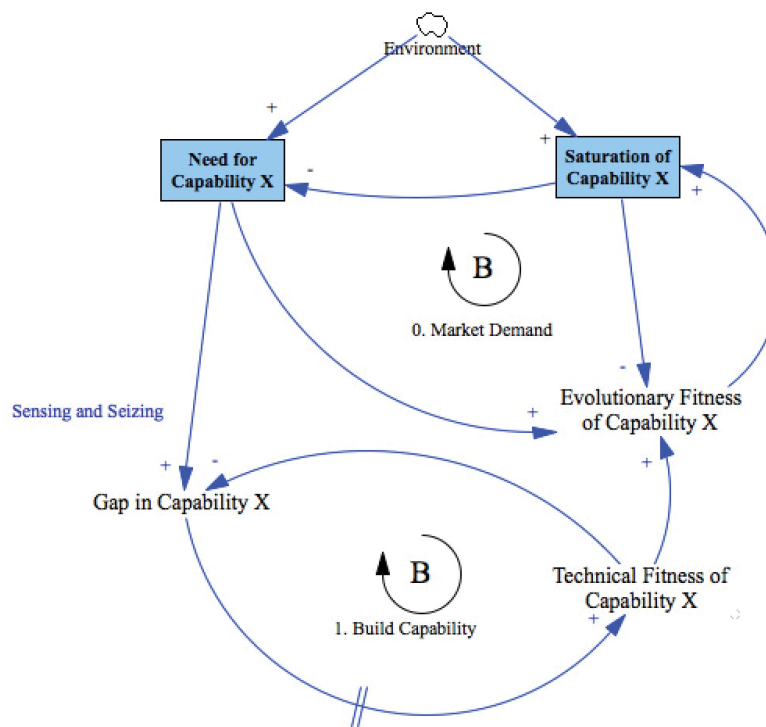


Figure 18 - Adaptive behaviour at the capability level

Table 21 – Description of system variables in Figure 18

Variable	Description
Need for Capability X	The demand for an organisational capability “X” emanating from the environment and creating a pressure to adapt.
Saturation of Capability X	How saturated the market is for the capability. This operates to dampen the demand driver.
Gap in Capability X	The gap between the need for the capability and the organisation’s current capability. Behind this variable is the organisation a) detecting the market demand, b) making strategic decisions to pursue, and c) being able to assess its own capability level.
Evolutionary Fitness of Capability X	How well the organisations’ capability matches the context it is operating in, which is a function of the exogenous demand and also the technical fitness (Helfat et al. 2007)
Technical Fitness of Capability X	The internal measure of capability performance, e.g. in terms of unit cost or quality (Helfat et al. 2007).

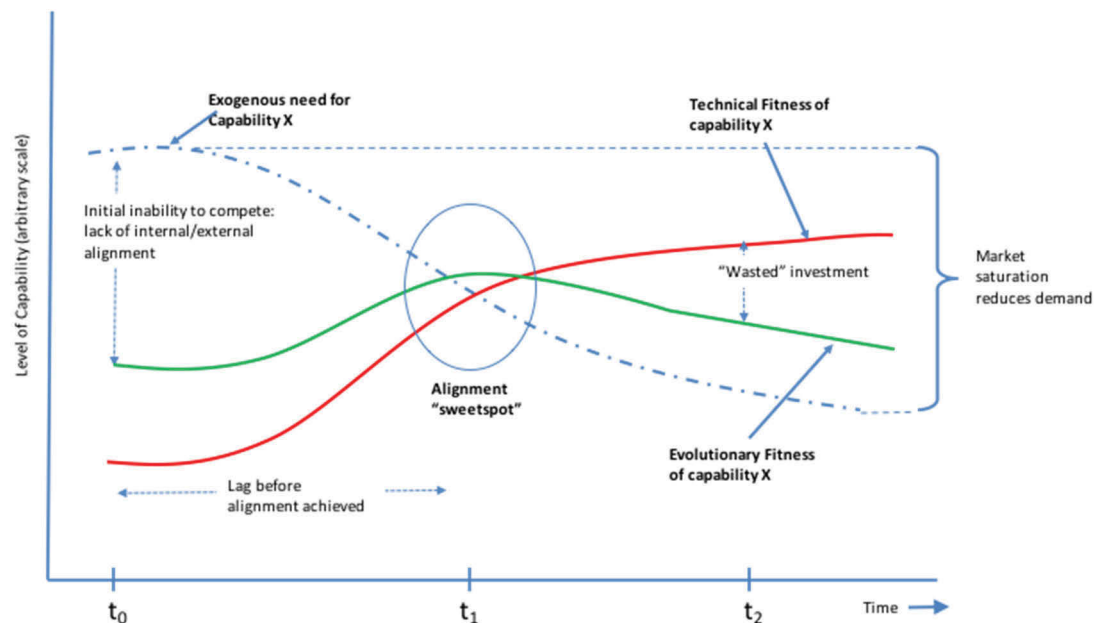


Figure 19 - Scenario showing capability fitness dynamics

The dynamics of the relationship between technical and evolutionary fitness constitutes an important finding in the context of organisational agility. Responsiveness (in terms of investing in and achieving technical fitness over a given timeframe), is not sufficient in itself. The relationship of the technical fitness curve to the evolutionary fitness, which is in part mediated by the exogenous volatility (as depicted in Figure 19) tells us whether the agile response is effective.

These dynamic behaviours are illustrated in the context of the case study organisations. As an example, for ABC the emergence of robotic process automation (RPA) as a market trend in IT services is a case in point. The fact that all ABC's competitors were developing capability in this area, led to a realisation that ABC had to quickly develop its own capability. However, they were starting from a low base (i.e. low technical fitness). Speed to market (i.e. in the order of months) was key to being able to gain a competitive position, but even so the saturation of the marketplace in this capability was beginning to be evident, as more and more firms became able to deploy RPA capabilities. Thus, for ABC, finding the sweet spot illustrated in Figure 19 was critical.

9.2.2 Business Process Level

Figure 20 introduces adaptive behaviour that occurs in the business process layer, as has been discussed in the context of the socio-technical foundations of the Framework and verified in the case studies. Technical fitness (Helfat et al. 2007) refers to how well the capability functions, independently of whether it is the "right" capability as determined by the organisational

environment. At this level, the diagram shows there is a mechanism operating that acts to sustain the technical fitness of a given capability in the face of “process constraints”. Importantly, whether something is a constraint or not is a perception on the part of the human participant, it is not an attribute of the business process or technology per se. Of course, this perception is affected by whether business process is complex, ambiguous or onerous, for example.

The net effect of the BP improvisation is to sustain the fitness of the organisational capability (feedback loop 2), countering the effects of the process constraints (which at this level include technological and human dimensions).

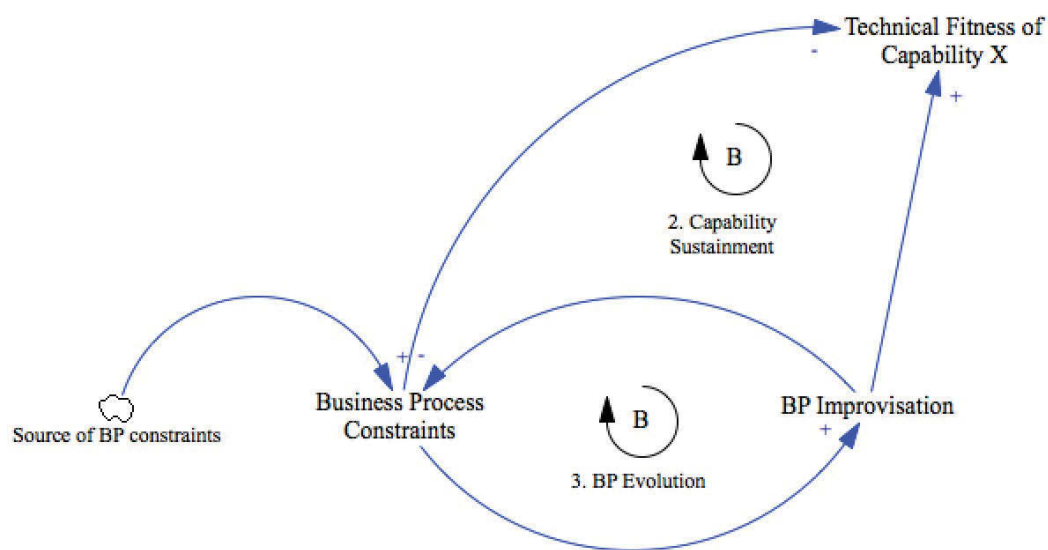


Figure 20 – Business Process Evolution

Table 22 - Description of system variables in Figure 20

Variable	Description
Business Process Constraints	The amount of constraint that operates on the human participant in the business process in terms of their ability to achieve their goal. Examples of these in the case studies where the process complexity, the process compliance requirements and level of IT support for the process.
Business Process Improvisation	The level of deviation from the understood (ostensive) business process that occurs in the course of the performance of the business process by the human actor.
Technical Fitness of Capability X	(as described previously)

The business process evolution is a function of the ostensive-performative duality intrinsic in the conceptualisation of human-centred business processes. The evolutionary behaviour of the business

processes is shown as a feedback loop (3), between the constraints and the improvisation needed to work around them. This captures the idea that this evolutionary behaviour stems from and is motivated by these constraints, but also that it is self-limiting: as the workarounds and improvisations become embedded, there is some stability that emerges and they become business-as-usual. This tendency to improvise and then embed the results as normal practice was in evidence across all the case studies. Note that external source of business process constraints is included on the diagram to show that the systems that are responding to the constraints are not closed.

This diagram in one sense decomposes “build capability” loop in the previous diagram (Figure 18) since it concerns the factors that influence the achievement and sustainment of the technical fitness of a capability. Here management’s top-down action to reconfigure the business processes in order to achieve this capability uplift affects the ostensive aspect of the business processes. This can be one source of the process constraints on this diagram, since they represent, to the human actors, a change to the way they are currently doing things. The extent to which these actors are equipped to navigate the changes (e.g. through some organisational change management program) will determine how much the new process design is adopted - and reflected in the level of business process improvisation that ensues. The other side of this equation is the bottom-up inertia the BP evolution creates as practices become embedded and more difficult to change.

These dynamics are again well illustrated in the case studies. As an example, for SupaMart, even though there was a high degree of process codification, there were also multiple instances where the judgement of the individual or the knowledge of the “experienced hand” was essential in the process-as-practiced meeting the needs of the capability being delivered.

“...the superficial process isn’t necessarily followed, it isn’t necessarily documented as well as it should be and the control points are more based on people rather than process. And they’re circumvented because of this desire to meet this need of a particular date.”
(SupaMart - Operations Manager)

In other words, in the language of Figure 20, the business process has evolved in practice in the face of process constraints to sustain the technical fitness of the capability.

9.2.3 Individual Level

At the individual level, the source of the business process evolution is analysed.

The phenomenon of “improvisation” in term of both technology and business process workarounds was well supported by the case studies. In Figure 21, the improvisation is shown as action on the part of the individual to mitigate the business process constraints. As we have seen, at the business process level (Figure 20) the improvisation shown by the staff in these organisations was motivated by the (perceived) need to sustain the particular capability *despite* the obstacles represented by poor IT systems or the complex or overly prescriptive procedures. This is a manifestation of the human judgement and experience that imbues the business process with flexibility at the “how” level as opposed to the “what” level (De Albuquerque & Christ 2015).

How technology is used operationally to support the business process is revealed at this level. In Figure 21, feedback loop (5) represents the improvisation of technology workarounds in the face of the perception of technology affordances (or constraints) by the user. This was a common phenomenon observed across all case studies, exemplified by the creation of spreadsheets and miscellaneous databases.

“I would be very surprised if the CIO understood the extent there are these little MS Access databases and Excel spreadsheets with very complex macros, that actually run our business.” (SupaMart – Operations Manager)

The primary source of the technology affordances is of course the organisations IT system portfolio, the extent to which the functionality provided by the current IT systems are regarded as affordances – or in other words they are regarded as “useful” – is the primary technology-in-use issue for the organisation to address.

Feedback loop (4) is where the outcome of this technology improvisation makes a difference at the business process level, by acting to reduce the process constraints. In other words, the improvisation at the technology level has an outcome in terms of enabling the business process, since it is this latter element that is going to contribute to the technical fitness of the organisational capability being sought. These relationships describe the essence of the “operational alignment” between business and technology. Whether this alignment is valid at a strategic level is determined by the technical and evolutionary capability fitness at the higher levels in the model, as has been discussed.

Another aspect of alignment highlighted in this diagram is the “choice” between process improvisation and technology improvisation that is implied (labelled A and B in the diagram respectively), in response to the business process constraints. This is the essence of the imbrication

concept (Leonardi 2011) where the judgement on the part of the human actor will be influenced by the respective flexibilities of the processes and the technology.

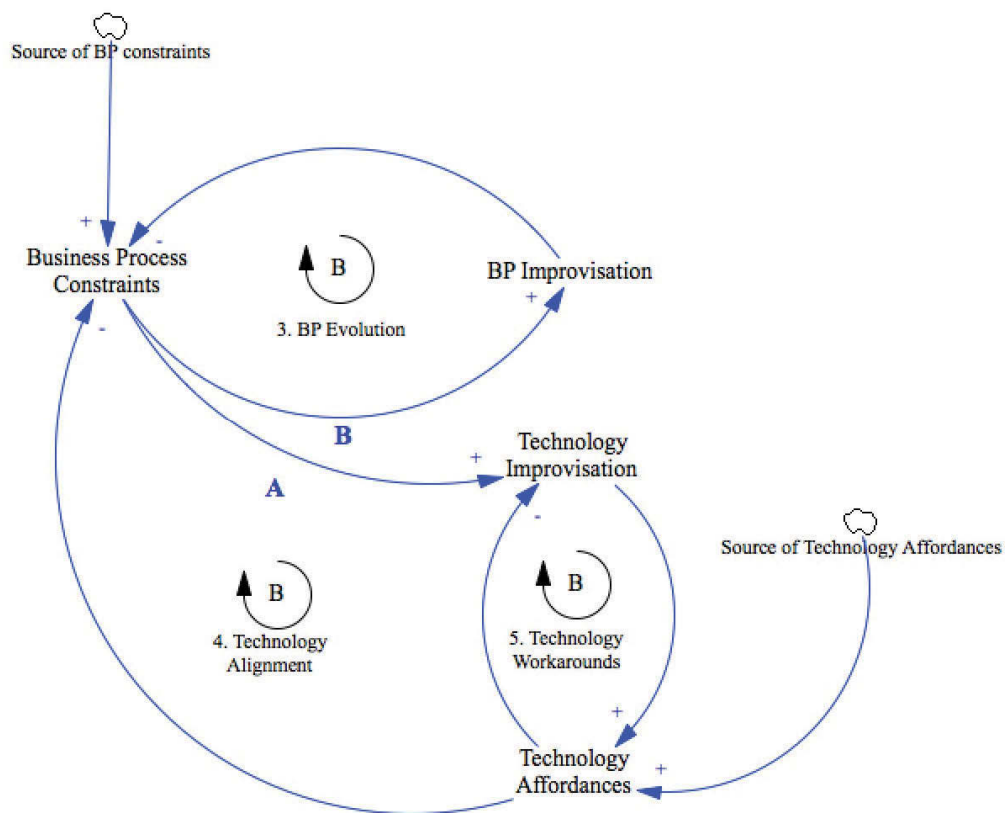


Figure 21 – Individual Level: Technology Improvisation

Table 23 - Description of system variables for Figure 21

Variable	Description
Technology Improvisation	The amount of improvised technology solutions that are developed to work around perceived technology constraints/affordances.
Technology Affordances	The level of technology functionality that is “useful” from the perspective of the user
Technical Fitness of Capability X	(as described previously)
Business Process Constraints	(as described previously)
Business Process Improvisation	(as described previously)

The following example from case study organisation SupaMart is illustrates this mechanism:

“So what we’re doing to circumvent the processes is becoming extremely flexible in our timelines. So in essence the agility is around people probably working longer hours, taking short cuts in the process, circumventing some of the work flows or tools that have been put in

place, by phone calls or communications. To get things out the door on that right time.” (SupaMart – Operations manager)

In other words, the response to perceived constraint is to workaround by improvising changes to the process (path B) and circumventing the technology.

9.3 Integrated Model

Bringing these models of behaviour together, in Figure 22, from a systems perspective, represents the organisation as an ecosystem¹⁹ of adaptive components that spans the exogenous and endogenous viewpoints.

¹⁹ *Ecosystem* is used in an analogical sense, representing the integrated system of adaptive components in the framework model

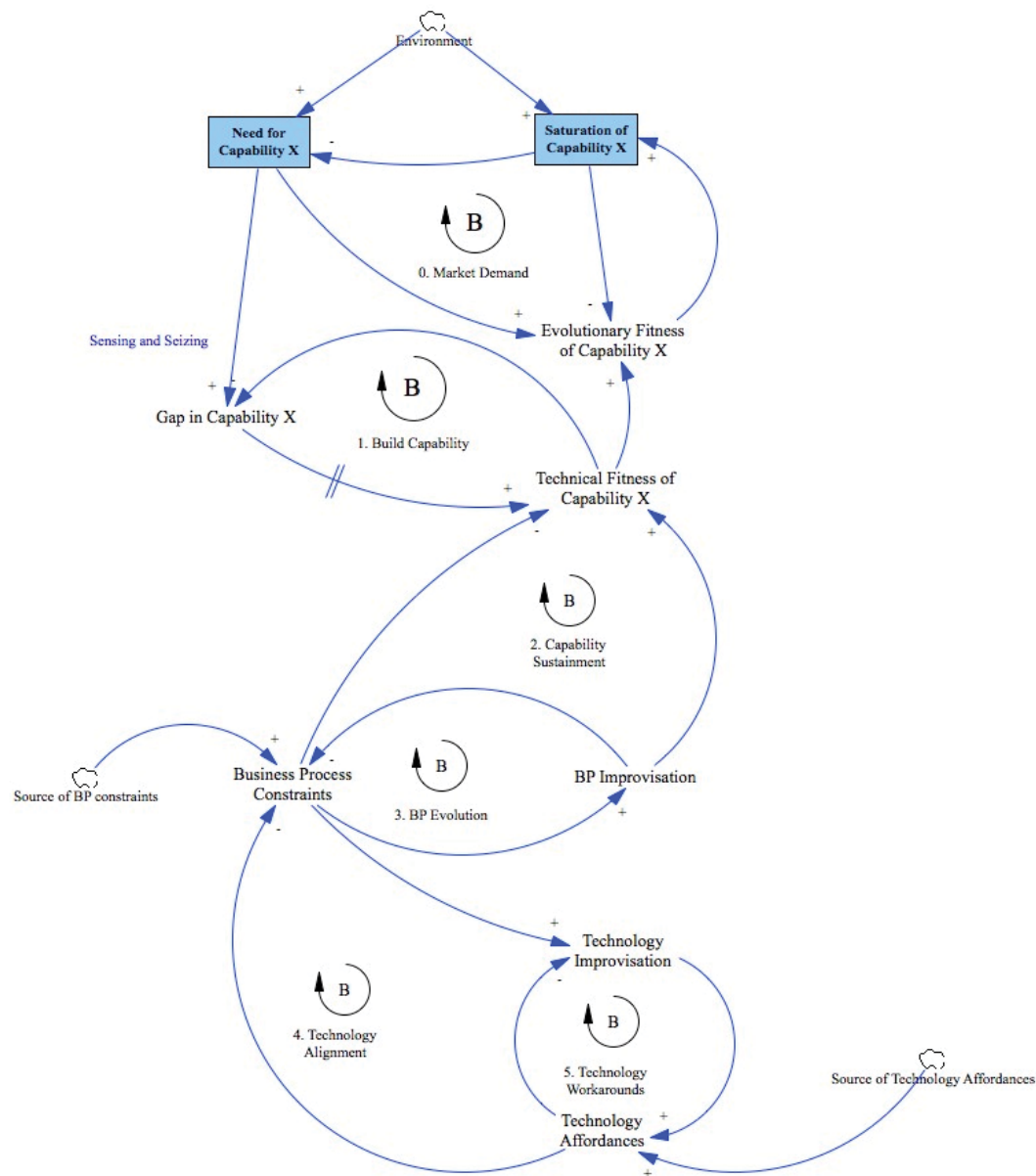


Figure 22 – Integrated Model

In terms of describing the components of the organisation’s response to external demands, this behavioural model offers several insights. The feedback loops marked (B) are termed *balancing*. This means they act move towards a goal at which they stabilise. Thus, at loop 0, the market drives the need for a capability until it becomes saturated thereby damping the demand driver. At loop 1, the organisation builds capability until it “detects” the appropriate technical fitness of that capability and so forth. The fact that these adaptive systems are interconnected immediately raises the question of goal alignment. Thus, the crucial consideration for the organisation is “where are the tensions in the model that indicate that the goal seeking behaviours are operating antagonistically?” In Table 24, the potential points of conflict suggested by the model in Figure 22 are summarised.

Table 24 - Potential goal conflicts

Locus in Figure 22	Nature of Conflict
Capability Level Feedback loops (0) and (1)	Capability agility. As discussed in section this area of the model relates to the overall agility of the organisation. There are two issues that can surface here. The first is the lag between the sensing and shaping of the required capability, and the realisation of the capability through the resource orchestration. The second relates to whether the management function within the organisation that understands the capability “gap” is operating effectively.
Capability Level Feedback loops (1) and (2)	Organisational inertia. The adaptive system represented by feedback loop (2), while acting to circumvent perceived blockage to operations represented by process constraints, is also a source of inertia for the organisation in the sense that there is a drive to maintain the technical fitness of a <i>current</i> capability. Any lag between detecting that this capability is no longer required or that a new capability is required would represent a major organisational misalignment. The important point being that the sustainment of the capability via this mechanism is agnostic of this alignment problem, and therefore intentional intervention is required to perform the re-alignment.
Business Process Level Feedback Loops (2) and (3)	Business Process Drift. The Framework has characterised the business process as a socio-technical artefact that evolves as repeated practice becomes business-as-usual. This is a doubled edged sword when it comes to maintaining the technical fitness of the capability: The performance of a business process can both sustain a given capability despite the constraints, due to the skill and motivation of the participants. However, it can also potentially cause a different outcome as “bad” practice becomes ingrained. It would be the role of organisational compliance functions to maintain this alignment.
Business Process Level Feedback Loops (3) and (4)	Business Process Workarounds. Business process constraints, either emanating from the supporting technology or due to the nature of the process itself, can be circumvented through process or technology improvisation, or a combination of both. As shown in the case studies, in some circumstances there may be an option to choose between the two depending on which is “easier” from the participant’s point of view.
Individual Level Feedback Loops (4) and (5)	Technology Affordances. This area is the “lowest” level of alignment of technology to business: at the individual level. Here, via loop (5), the individual makes a subjective judgement of the utility of the available technology, the affordances, and may decide to work around technology constraints by improvisation. The potential conflict is whether these affordances (either improvised or already available) actually contribute to the business process (via loop 4).

The model presented shows the interplay between the external and internal drivers of organisational behaviour in terms of an integrated system of adaptive components that span the exogenous and endogenous aspects of the organisation. This provides a lens into the organisational capability as a dynamic object comprising a balanced set of adaptive relationships between humans and technology coming together as performative business processes. The Framework has characterised organisational agility in terms of how rapidly it can detect and respond to a need to deploy new organisational capability. By developing a building block model of these capabilities, in socio-technical terms, several microfoundational components to organisational agility have been

identified, corresponding to the layers in this model shown in Table 24. Following a levelled view of microfoundations (Devinney 2013), each layer represents a unit of analysis which, of course, is dependent on the next layer down in the model. Thus “level 0” represents the least granular, most abstract perspective. These are now summarised, together with possible management interventions in Table 25 below.

Table 25 – Agility Microfoundational Levels

Micro-foundational Level	Defining Question	Agility Determinants	Types of Management Interventions
Capability	“What capability is required to stay in business?”	• Presence of dynamic capabilities: Sensing, Shaping, Orchestration and Monitoring.	• Strategic planning • Innovation programs • Partnerships
	“Can we realise the required capability in time?”	• The degree to which people are invested in the current ways of doing things. • The presence of an adequate resource base within the organisation with which to create new capability • The communication of management intent	• Management communication • Process re-engineering • Organisational change management
Business Process	“How is actual practice aligned to strategic intent?”	• The understanding people have of what the business process is trying to achieve • The flexibility available to the individuals to work towards the intent of the process rather than necessarily follow all the steps • How best practice is captured and promulgated	• Training in business processes • Knowledge Management • Delegations of authority to empower individuals
Individual	“How do the staff understand what they’re supposed to do?”	• Complexity of business processes • Degree of understanding of the process steps by individuals • Degree to which understanding of the process is shared	• Training in business processes • Lean and six sigma initiatives • Documentation of standard operating procedures
	“How does technology help people do their job?”	• Functionality and usability of IT systems • Availability of flexible toolsets such as Excel and Access • “Technical savvy” of personnel to engage in technology workarounds • Degree of IT governance across business units to control “shadow IT”	• Training in IT systems • Clear model of IT governance • Legacy systems transformation • Enterprise architecture

This table reveals some interesting perspectives on agility. First, there are human-centric mechanisms operating at several levels within the organisation each of which have a bearing on the overall agility of the organisation. Second, as shown in Figure 22, this is an inter-related landscape where there is adaptive behaviour between the components. Thus, the idea of agility in this context is as an emergent property for which there are a number of determinants. Causality is therefore complex and difficult to isolate down to single factors. A third point noted in Table 25 is that there is an appropriate type of management intervention to influence the particular adaptive component. Those listed can be considered the “traditional” approaches to managing business, IT and change in the organisation; however, the cautionary note coming from the Framework is that organisations have intrinsic *compensating* mechanisms as represented by the ecosystem. This means that any one of these interventions in isolation will cause compensating behaviour in some aspect of the ecosystem. Thus, for example, one can implement new, more flexible IT systems, but if the business process level is still constrained then compensating actions may still be to improvise technology or process workarounds for the new system. It has been outside the scope of this project to pursue these compensating mechanisms further, but it represents a possible line of future research. That (senior) management is a strong determinant of evolutionary fitness through their own cognitive capabilities is a current theme in dynamic capability research (Augier & Teece 2009; Teece 2012; Helfat & Martin 2015; Helfat & Peteraf 2015). One of these capabilities is the ability of managers to take purposeful actions to reconfigure the organisation’s resources to meet a new environmental demand (Eggers & Kaplan 2013). The current research shows that managers must also be mindful of the possibility of unintended consequences to their actions.

There is a correspondence to the idea of organisation as a hierarchical multilevel system (Mesarovic, Macko & Takahara 1970). In a general sense, hierarchical systems are not confined to structural hierarchies such in the traditional view of an organisation (comprising entities such as departments and teams etc) where the levels are materially nested within each other. Simon (1997) uses “hierarchy” more generally, such as in the decomposition of a complex system into a hierarchy of interrelated subsystems, where the levelling may be defined by, for example, spatial relationships, by strength of interactions, or by “black box” functional sub-assemblies. The objective of hierarchical multilevel systems theory is to reduce a complex decision problem (at the top level) into a set of simpler sub-problems that are tractable to solution. The theory emanates from mathematical operations research and has been used to solve complex control problems such as planning, resource allocation and scheduling problems (Dirickx & Jennergren 1979). Despite the difficulty of applying the mathematical solution techniques to the conceptual level treatment of organisational

agility presented in this thesis, there is potential value in using the theory as a modelling tool. Mesarovic *et al.* (1970) characterise the organisation in terms of goal-seeking decision-making units existing at different levels. The decision problem is how to deal with subsystem goals that are not necessarily aligned to the overall system (i.e. organisational) goal which resonates with the goal-directed Framework behaviour discussed above. Applying hierarchical multi-level system concepts would focus on defining the sub-problem hierarchy and associated information flows; in other words, forcing more clarity on system structure. It has been outside the scope of the current research project to pursue this further, but this could represent a future research opportunity.

9.3.1 Comparison to Other Treatments of Agility

At this point it is timely to revisit the literature and compare the preceding conceptualisation of the organisation to other models that have attempted to achieve a similar objective. In Table 26, some prominent extant theoretical work is compared to the Framework in terms of the dimensions that have been discussed, with the aim of highlighting similarities, differences and the contribution of the current work (represented by the shaded first row in the table).

The following points are highlighted by the comparison of the representative work listed in Table 26:

- Use of coarse grained models for which causality is inferred using standard quantitative approaches, are highly represented in the extant work.
- The insights available from this extant work on the actual mechanisms that give rise to agility are limited due to a reliance on probabilistic causality (Gregor 2006).
- There is a paucity of models that relate operational level factors to overall organisational performance and, in particular, to agility. Most theoretical models are coarse grained, often at the organisation level.
- There are few examples of the use of a socio-technical treatment of business process (e.g. De Albuquerque & Christ 2015). This type of cross-disciplinary conceptualisation has the potential to offer more insight into human centred dimension of organisational phenomena such as process flexibility.

In summary, the current Framework raises a complementary perspective to these points: it is fine grained, focusses on the mechanisms underpinning agility and provides a conceptual bridge between operational level activities and organisational level phenomena.

Table 26 - Comparison of Approaches to Agility

Reference	Organisational Paradigm	Lowest level granular concepts that influence agility	Characterisation of the Source of Agility	Role of Technology	Reasoning about agility ²⁰
Crick model of organisational agility	Organisation as an adaptive multilevel ecosystem based on Resource Based View (RBV) concepts	Socio-technical business processes comprising technology affordances and human agency	An emergent property determined by an adaptive ecosystem of building blocks at multiple levels	Technology affordances or constraints in socio-technical business processes	Causality in terms of granular organisational mechanisms.
(Weill, Subramani & Broadbent 2002)	RBV	IT capabilities defined as clusters of IT infrastructure services	Targeted IT Infrastructure investment enables business initiatives to be implemented with faster time to market	IT infrastructure services as IT capabilities	Coarse grained Probabilistic causality ²¹ based on quantitative empirical studies
(Sambamurthy et al. 2003)	RBV	IT capabilities built up from IT competences	IT Capabilities are dynamic capabilities that create “digital options” that are the basis for agility	IT Capabilities that provide “digital options”	Coarse grained Theoretical nomological network of concepts posited
(Lu & Ramamurthy 2011)	RBV	IT capabilities decomposed into 3 subtypes	IT spending as a mediating effect between IT capability and agility	IT spending as IT capability building	Coarse grained Probabilistic causality based on quantitative empirical study
(Jacobs et al. 2011)	Modular systems perspective on processes and products	Product modularity gauged across 2 dimensions; Process modularity gauged across 3 dimensions	Product modularity is a positive antecedent for manufacturing agility due to decomposability (this study noted no relationship between process modularity and agility)	Included within the definition of process	Coarse grained Probabilistic causality based on quantitative empirical study
(Tallon & Pinsonneault 2011)	RBV	IT flexibility comprising 3 factors	IT flexibility gives rise to agility, through scalability and adaptability.	IT flexibility as enabler of agility	Coarse grained Probabilistic causality based on quantitative empirical study

²⁰ How the particular model allows reasoning about the causes of agility²¹ (Gregor 2006)

A Framework for Understanding the Role of Business-IT Alignment in Organisational Agility

Reference	Organisational Paradigm	Lowest level granular concepts that influence agility	Characterisation of the Source of Agility	Role of Technology	Reasoning about agility ²⁰
(Chen et al. 2014)	RBV	IT capabilities decomposed into 6 subtypes.	Business process agility (and hence organisational performance) is shown to be dependent on IT capability, mediated by environmental factors.	IT capability as creator of business process agility	Coarse grained Probabilistic causality based on quantitative empirical study
(Queiroz 2015)	RBV	IT application orchestration as a dynamic capability	Renewal of the IT resource base creates flexibility and is shown (empirically) to have a positive effect on agility.	IT resource base renewal creates flexibility	Coarse grained Probabilistic causality based on quantitative empirical study
(Mamouni Limnios et al. 2014)	Organisation as a complex socio-ecological system	Resilience ²² construct at <i>system</i> level: organisation decomposed into systems based on organisational subunits with identifiable goals	Dynamic capabilities give rise to the “adaptivity” component of resilience	Not within scope of model	Coarse grained Theoretical framework characterising types of resilience. No causal reasoning
(De Albuquerque & Christ 2015)	Actor-network theory	Business process models comprising sociomaterial actor networks	In this model business process flexibility ²³ comes from sociomaterial practices	Incorporated into sociomaterial construct of business process	Fine grained. Insight into mechanisms that give rise to flexibility at the actor-network level

²² This paper describes resilience as a superset of agility, though not strictly comparable to other work presented here, it is included as a complementary perspective.

²³ This paper does not put forward an organisational level theory, but is included as an example of recent work that applies a sociomaterial lens to business process flexibility.

9.4 The Framework as a Theoretical Artefact

9.4.1 Requirements

This thesis has set out to develop a new theoretical artefact in Information Systems. This artefact is represented as a Framework for explaining and predicting the phenomenon of organisational agility and the role of technology. In Chapter 4 *Initial Theoretical Development*, some requirements to satisfactorily meet this research objective were stated, founded on Gregor's (2006) criteria for sound theory in Information Systems. This section revisits these requirements in the context of the completed research project.

Table 27 offers an assessment of the Framework against the original set of requirements. For convenience of reference, the Framework components, as they stand at the completion of this research project, are included in *Appendix 1 - Post hoc Summary of Framework Components*.

Table 27 – Assessment against Framework Requirements

General Requirement	Framework meets requirement?	Key points of evidence
Representation. The means of representation, the constructs of interest and the relationships between the constructs.	Yes	- Conceptual model has a concise graphical representation across different levels of abstraction. - Constructs and relationships are clearly defined.
Explanations. A desirable state is for all logic contained within the framework to be explicit. In other words, any explanation generated by the Framework should be able to be justified in terms of the Framework. A corollary to this is that the Framework is logically consistent: that it is not possible to generate mutually conflicting explanations.	Yes	- Explanations are couched in terms of emergent systems behaviour. - Causality is inferred from mechanisms that are explicitly modelled.
Predictive Power. The Framework aims to make propositions about the organisation that have some degree of generality.	Yes*	The Framework claims generality in the terms of the <i>existence</i> of the mechanisms that have been posited in the models.
Parsimony. As with any good science, the principle of parsimony should apply: it is as simple as possible and the number of assumptions is held at the minimum possible.	Yes	- A small set of constructs is used. - The conceptual model is simple and easy to understand.
Utility. The objective of the Framework being relevant to practice requires it to have utility. There should be ease of use and the explanations generated should be of value to the organisational stakeholders targeted.	Yes	The utility of the Framework has been argued across multiple levels in the organisation.
Domain Specific Requirement		

Ontology. The literature review found various inconsistencies and ambiguities in the concepts used in this problem domain. It is thus important that the Framework's ontology is not only well defined but also provides a clear line of connection to the extant research, so that it is always clear how the terms and concepts are being used.	Yes	- Widely accepted definitions have been adopted for the core conceptual components. Their clear basis in extant theory has been reasoned. The resource-based view of the organisation is a foundational principle. - Cross-disciplinary concepts have been disambiguated in definitions.
Granularity. A finding was that existing theories of business-IT alignment are, with some exceptions (e.g. Tallon 2007) not fine grained enough to support inferences about agility, for example, at the organisational capability level. The representation must therefore be able to support fine grained components.	Yes	- The organisation is represented in term of well defined, granular building blocks. - A coherent model of the relationships between the building blocks across the levels within the organisations has provided a way of inferring macro-level behaviour (such as agility) from micro-level actions (such as use of technology) which has been the major research objective.
Dynamics. A finding was that the well-established theories of business-IT alignment have tended not to treat the dynamic element of the business environment convincingly.	Yes	- Framework takes an intrinsically dynamic perspective: organisational building blocks are conceptualised in dynamic relationships. - Characterisation of dynamic behaviour is a component part of the Framework.
Socio-technical dimension. Organisations are as much social objects as they are mechanical artefacts (Morgan 1997). Given the human behavioural dimension involved in organisations, there is an imperative for the Framework to accommodate the viewpoint of the technology-in-use suggested in the organisation science literature, as a means of shedding light on the role of human agency in the overall question of agility.	Yes	- This has been a core motivation behind the way the organisation is conceptualised. - Reconceptualisation of business processes as socio-technical objects, drawing on theories of organisational routines (Pentland & Feldman 2005) and technology affordances (Zammuto et al. 2007; Leonardi 2011), is central to the Framework's model and in the associated theorising about the observed effects of human agency.

9.4.2 Generalizability

The area of potential weakness highlighted (*) in Table 27 is worthy of further discussion. With respect to predictive power, it is relevant to consider the type of theory that this research has sought to build. Following Gregor's (2006) typology, a type IV theory – a theory for explaining and predicting - aims to have predictive power in terms of underlying causal structures. In other words, beyond causation being regarded as simply a “black box”. Explanation in terms of causal mechanisms can be claimed by the Framework, but a question arises as to the generalizability of the result given the qualitative, interpretive approach taken to the case studies. To what extent does the developed theory just capture the idiosyncrasies of the case studies, for example. The response to this is the principle of *theoretic* (or analytic) generalisation which is applicable to case study research of this kind (Yin 2009; Tsang 2014). This principle draws the distinction between the idea of the case study as a *sample* from a population, and the case study as an *experiment* used to inform theory

building. This latter category is what is meant by theoretic sampling. In a similar way to building a theory about the natural world, valid theoretical constructs can be derived from very few observations of a given result, provided there are suitable controls and the result can be repeated. In the case of this research project, the research design has addressed this issue in terms of triangulation of data sources, both within and across the case studies. This forms the analogue of “replication” in experimental sciences. The fact that the same phenomena are observed across case studies provides the evidence required to validate the constructs and obtain theoretic generalisation.

Apart from this methodological issue, a more practical question relates to making predictions using a Framework such as this. Couching explanations in terms of behaviour that emerges from an ecosystem of adaptive components, causality is attributable to mechanisms operating within the organisation. However, a consequence is that inferring outcome states from precursor states is non-deterministic. This means there is no deterministic line of inference that links a set of outcome states to a set of input states. One can understand the *probable* outcomes since we have a logical mechanism (or set of mechanisms) that is posited as operating. An analogy here is weather forecasting: given a set of preconditions such as air pressure, wind direction, temperature and so forth, and our theoretical model of how weather systems work, we have a basis for predicting whether it will rain tomorrow. However, the causal connection is complex. As with any attempt to create an abstract model of reality, the challenge for the theory builder is to understand the major variables, their interactions and the feedback loops etc. that comprise the system, and particularly the opportunity for non-linear behaviours to occur. The potential of complex outcomes is also the justification for taking a systems-theoretic lens to the organisation: they are themselves complex and dynamic entities in a complex and dynamic environment.

10 Conclusion and Further Research Directions

10.1 Conclusion

The modern organisation finds itself in a complex dynamic environment. New forces in the marketplace such as globalisation and the digital economy have increased the need for rapid adaptation just to stay in business. These forces are juxtaposed with regulatory environments of increasing complexity that act to constrain the notion of the free market economy. How organisations respond to these conditions has occupied researchers across multiple disciplines. Management science has, for example, sought to understand the strategic decision making required for the organisation to continue to make a living. On the other hand, the organisational sciences have looked at the human behavioural and social systems that give rise to organisational level phenomena. Then there is the role of technology. Information systems scholars have for a long time sought to understand the concept of business and technology “alignment”, and even if such an idea still has relevance in the fast-moving modern world.

What is clear from this is that there is, firstly, a compelling set of circumstances facing virtually all large organisations that use technology as a core business enabler, and secondly, a wealth of research perspectives that has created a significant body of work. Notwithstanding this body of extant work, the literature review conducted at the outset, uncovered several deficiencies and consequent opportunities for the development of a novel theoretical artefact that would make a contribution not only in theoretical terms, but also be of practical benefit to business and IT managers.

Contributions to Theory

The Framework developed in this thesis represents a novel, cross-disciplinary approach to understanding the organisation and providing insight into the source of inflexibility within the organisation, and the roadblocks to organisational agility. The contribution to theory may be summarised against the research questions, posed at the outset, as follows:

- **Ontology** The body of extant work across research disciplines represents an opportunity for “cross-pollination”, but only if respective ontological positions (and associated assumptions) are carefully considered. The Framework developed here has set out to adopt a cross-disciplinary perspective in this way. Throughout the development of the conceptual model, care has been taken maintain the grounding of the concepts in appropriate theoretical

context. The incorporation of socio-technical concepts from organisational science has enriched the human behavioural dimension that is traditionally understated in IS research.

- **Granularity.** Extant theory has developed several models of organisational building blocks, but has yet to arrive at an integrated, consistent view of the organisation such that macro-level phenomena could be understood in term of granular concepts. This research project has built a novel theoretical IS artefact that provides a new multi-level microfoundational model in terms of granular, socio-technical building blocks which specifically recognises the human behavioural role in the macro-level phenomenon of agility.
- **Reasoning Capability.** By elucidating microfoundational mechanisms, the theory defines a stronger causality model (Mingers 2004; Tsang 2014) for the explanation of organizational agility phenomena when compared to the traditional statistical models that are prevalent in quantitative management science research. The model describes causal mechanisms both *within* and *across* the levels of analysis. This reinforces the view that organisational phenomena such as agility are intrinsically multi-levelled in nature. Building on the classic internal/external alignment constructs of technical and evolutionary fitness (Helfat et al. 2007) operating at the capability level, this shows how the actions and interactions at micro, meso and macro levels are antecedents to these fitness constructs and thus how these all contribute to the overall agility outcome at the organisational level. In constructing such a perspective, this thesis has focused not only on the nature of the building blocks themselves but also on the *mechanisms* of interaction that actually create behaviours.

By characterising the organisation as an integrated system of adaptive components, the Framework offers a new model of causation in which precursors to organisational level agility are emergent phenomena at lower levels of organisational analysis. This is an important adjunct to the large amount of existing quantitative work that takes a weaker position on causality.

Contributions to Practice

The Framework's contribution to practice is as a tool for both business and IT managers to frame discussion and decision making. The Framework offers a view of the organisation that inherently relates to common management perspectives. In other words, entities such as business processes and organisational capabilities are accessible concepts that already have a role in strategic and operations management. It is thus possible to communicate the Framework's conceptual model, but more importantly, place a given organisational instance into the context of the Framework's

conceptual model. Positioned thus, the behavioural model can be used frame an ensuing discussion about the loci of inflexibility and the possible effects of certain management interventions.

It has been shown that several aspects of management practice are informed by the Framework. The model's multiple levels of analysis draw out the operational level implications of actions taken by executive management at the strategic level. By illuminating the adaptation mechanisms that exist within the organisation, the ramifications of interventions taken by management are brought into focus. Whereas each adaptive component responds to its own drivers and feedback effects, the inter-connectedness and dependencies across the integrated model show that for any intervention there is also the potential for unintended consequences, and this creates another cognitive challenge for managers. In sum, the Framework provides a theoretical basis for the development of applied management methodologies that could address these issues. One opportunity for further research and development is in how the Enterprise Architecture discipline (and EA frameworks) could incorporate these aspects.

Limitations

The Framework is designed to model an aspect of reality, and as with any abstraction of this kind, there are limitations that come from simplification. Simplifications reflect the trade-off between capturing the essentials of the problem space and retaining tractability and usefulness in explicative power. The following are explicitly noted:

- ***Organisations as simple competing entities.*** The Framework takes a simple view of competition based on organisational capabilities. This assumes a level competitive playing field, whereas the reality is more complex. There are pseudo-competitive oligopolies, for example, and regulatory environments that act to skew pure competition. There is also the effect the organisation itself can have on its own marketplace (Teece & Pisano 1994). The justification for this simplification, though, is straightforward. Aside from additional layers of complexity these aspects would entail in the model, the underlying logic of evolutionary fitness of capabilities would still be a relevant perspective. In other words, the additional complexity of having a more nuanced view of the competitive organisational environment would be manifested in terms of the evolutionary fitness construct and would not affect any lower levels of the model.
- ***Business Processes as Capability Building Blocks.*** The Frameworks depicts a simple view of the relationship between business processes and organisational capabilities. Of course, the relationship is in reality likely to be many-to-many, and also depends on the granularity of

the capability. Nevertheless, the principle embodied in the Framework is that business processes have an outcome and are guided by a purpose. This purpose is what aligns the business process to a particular capability. Thus, in a conceptual sense, even though it might be across multiple levels of granularity, a business process always gives rise to some (micro) capability. The task is then to align this micro-capability to the macro organisational capability (such as in a capability hierarchy).

- **Human Interactions.** The Framework largely ignores individual level interactions as a simplification at the human-agency level. Business processes are for the most part collaborative endeavours with multiple participants undertaking manual or technology enabled activities. Interestingly, since this research project has commenced, other research has emerged that applies actor network theory (ANT) to the conceptualisation of business processes (De Albuquerque & Christ 2015), specifically looking at flexibility. The collaborative dimension of business processes this admits could be an adjunct to the current work, even though the theoretical model as stated in this paper does not advance any firm casual models.

10.2 Further Research Directions

There are several future directions that are suggested by the research to date. Broadly these fall into two categories, firstly those aiming to gain further validation and refinement of the theoretical model, and secondly, those aiming to extend the model's scope. In the first category, there is an opportunity for follow up studies applying a complementary research methodology. An example would be a quantitative survey approach to gauge the validity of the model across a wider cross-section of organisations. The empirical themes from the current research are a good starting point from which to develop a targeted questionnaire for this purpose. Another tack would be a longitudinal study within an organisation spanning a period of an organisational transformation where there has been an intentional intervention to bring about changes to the operating model to promote agility, for example. The case study organisations presented in this thesis are candidates for such a follow-up study. Such "before and after" studies would offer a wealth of evidence for the mechanisms underlying agility that have been posited.

A further research approach supporting the refinement of the current Framework would be to undertake a systems theoretic simulation study. Under certain simplifying assumptions, simulation of this kind can verify the dynamics of systems models such as that depicted for the Framework. In one example (Pentland et al. 2012) a complex adaptive systems (CAS) approach is used to examine

the “organisational learning” perspective of the ostensive-performative nature of organisational routine, that has been part of the Framework’s conceptual model. In another example (Vidgen & Wang 2006) a similar CAS approach is applied to the understanding the evolution of business processes. Both examples demonstrate the feasibility of using a simplified model of organisational building blocks in a simulation model to provide insights about organisational dynamics.

There are also opportunities to extend the Framework in new directions, particularly to address some of the limitations cited earlier. As has been discussed, business processes are complex entities, involving multiple actors, multiple technologies and the interactions between these elements. Additionally, processes can be nested within other processes. The Framework greatly simplifies this complexity, and therefore is constrained by the assumptions it makes about business processes. In the literature, a multitude of theoretic lenses have been applied to gain further understanding of these phenomena, ranging across the positivist, realist and interpretivist philosophical positions. As has been argued in this thesis, it is possible to adopt a cross-disciplinary approach to produce valid theoretic models, such the socio-technical approach used here. Further study in this area might pursue the application of actor network theory (Latour 1987) to the conceptualisation of business process, following other recent work in this area (De Albuquerque & Christ 2015). ANT has the potential of introducing a richer view of human-human interaction into the picture. Activity theory (Kaptelinin, Kuutti & Bannon 1995; Virkkunen & Kuutti 2000) offers yet another “socio-cultural” perspective that situates the human (subject) their objectives (the object) and regards tools (i.e. technology) as something that mediates the relationship between the two. Activity theory has been posited as a different paradigm for understanding human computer interaction (Kuutti 1995; Nardi 1995; Kaptelinin & Nardi 2012). There is a clear potential for these theoretical models to inform the Framework’s central conceptualisation of business process.

A further research direction is suggested by the concept of resilience, which, as discussed earlier, can be regarded as a superset of agility (Mamouni Limnios et al. 2014), or in other words, agility is one property that resilient organisations may have. The concept, however, goes further than just this, embodying the idea of a constant state of renewal on the part of the organisation, “forever morphing, forever conforming itself to emerging opportunities and incipient trends” (Hamel & Valikangas 2003, p.54). The mechanisms elucidated and discussed in this thesis - that give rise to the organisation’s business process flexibility, inertia and agility - obviously apply to resilience. But a higher-level systems concept is also suggested, one in which agility is perhaps merely an epiphenomenon. This avenue should be pursued, not the least, to integrate the respective research perspectives.

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Appendices

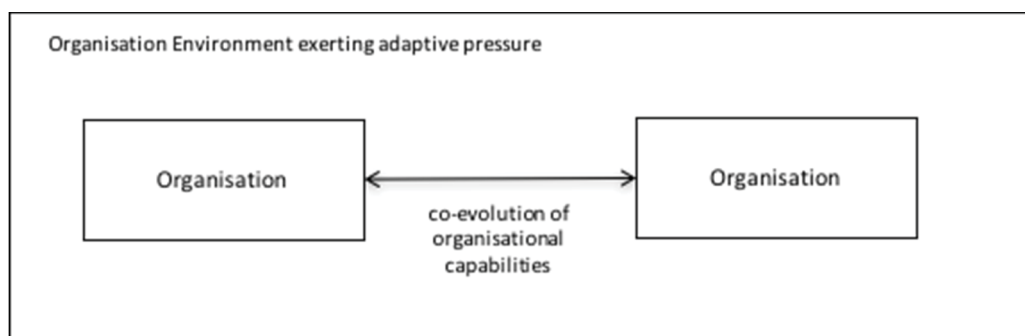
12 Appendix 1 - *Post hoc* Summary of Framework Components

12.1 Introduction

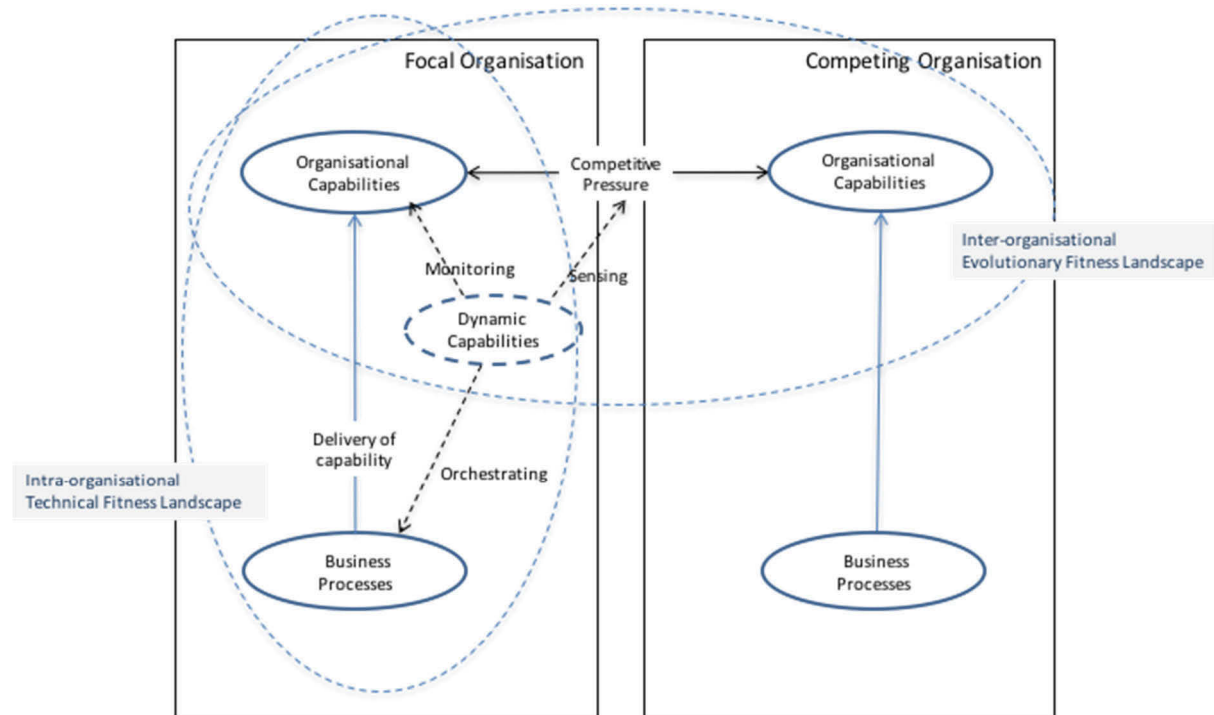
For convenience of reference, this appendix summarises the Framework components in their final form at the completion of the research project.

12.2 Conceptual Model

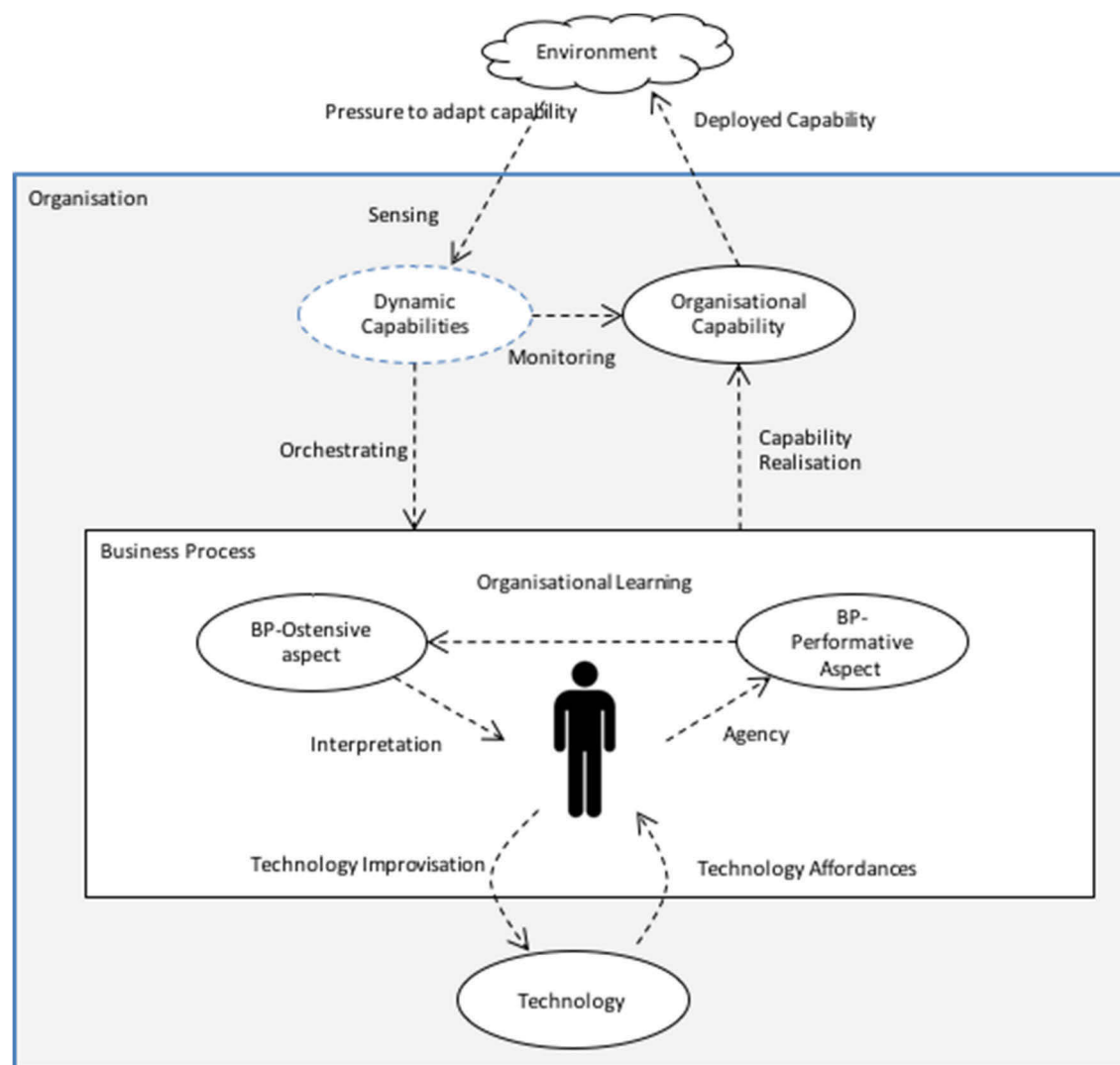
12.2.1 Level 0 – Coevolving Organisations



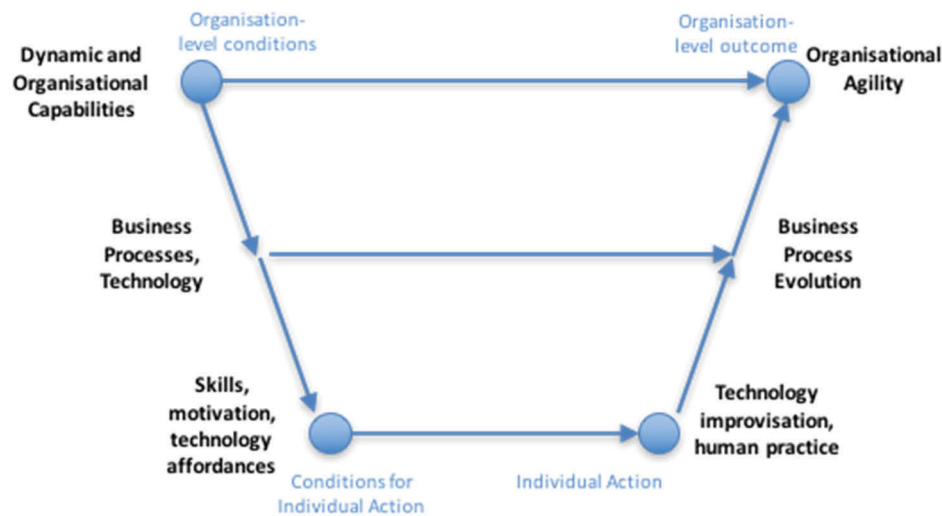
12.2.2 Level 1 – Intersecting Fitness Landscapes



12.2.3 Level 2 – Business Process as a Socio-Technical Object



12.3 Multi-level Microfoundational Model



12.4 Construct Definitions

12.4.1 Organisational Building Blocks

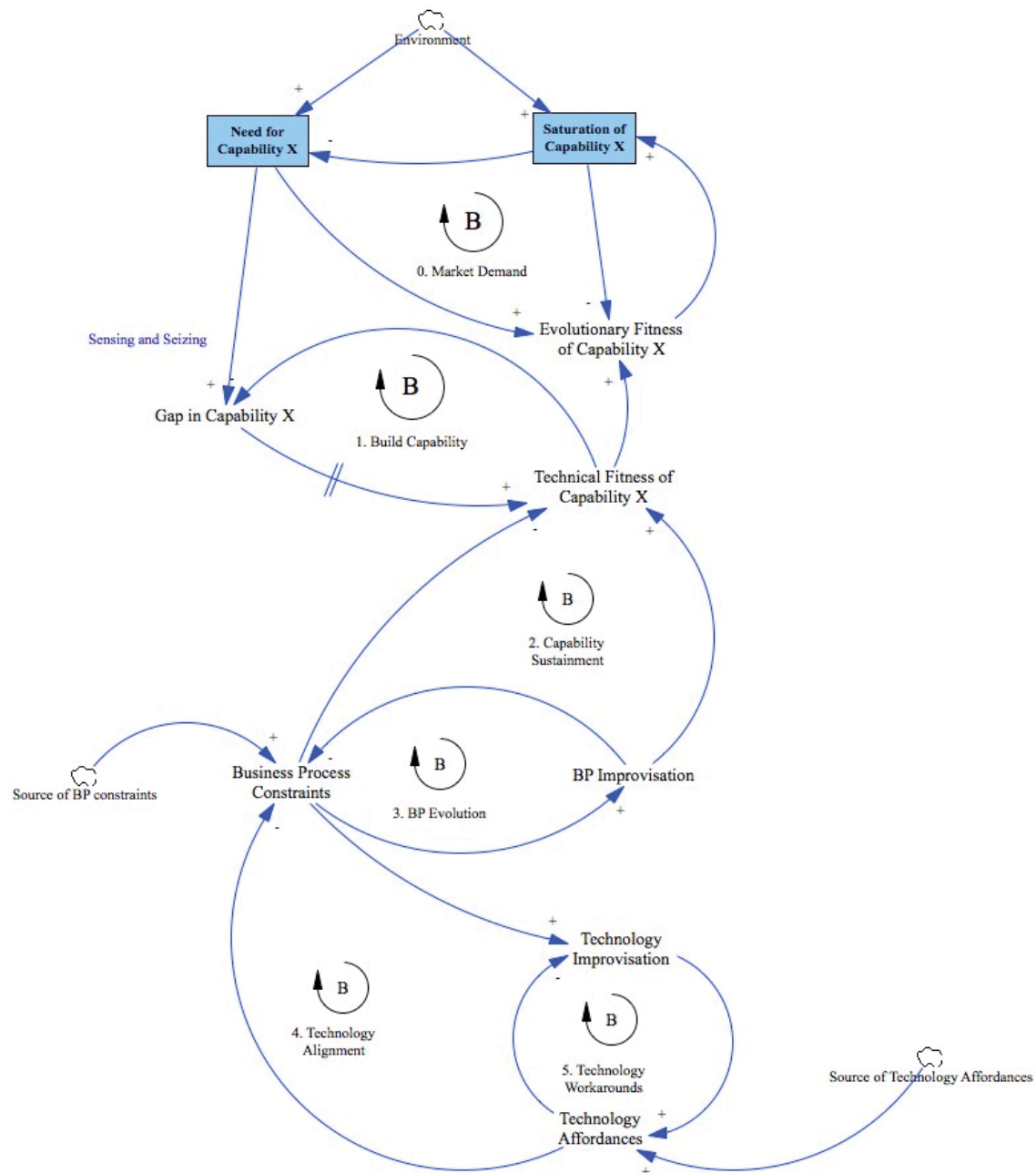
Construct	Description
Organisational Capability	The ability of an organization to perform a coordinated set of tasks, utilising organisational resources, for the purpose of achieving a particular end result. (Helfat & Peteraf 2003)
Business Process Definition (Ostensive)	An abstract pattern of actions that persists within the organisation and forms the basis of subsequent practice of that business process (derived from Feldman & Pentland 2003). The ostensive form has two precursors: 1) explicit management process design intervention; and 2) repeated practice by individuals embeds it as the “usual way of doing things”. The ostensive aspect of business processes implies a representation in some form, although it may simply be what is “generally understood” rather than something explicit.
Business Process Instance (Performative)	The specific, concrete set of actions that is enacted by human agents based on their situated understanding of the ostensive business process.
Technology	In an abstract sense, technology is a human artefact that provides actionable features designed to support the execution of business processes. In practice, within the scope of this research project, this refers to IT systems with user interfaces.

12.4.2 Relational Constructs

Construct	Description
Adaptive Drivers	Forces derived from the business environment placing a requirement on the organisational to adapt its currently deployed organisational capabilities
Adaptive Response	The organisational capabilities that are deployed into the environment by an organisation

Construct	Description
Agency	The action that is taken by the human actor based on the process and technology affordances in order to achieve their goals.
Demand for Capability	The requirement placed on the business processes to realise an organisational capability.
Interpretation	The interpretation the human actor places on what to do in practice based on their understanding of the process and contextual factors
Organisational Learning	Organisational learning covers any mechanism by which the persistent ostensive form of a business process within an organisation is informed by the practice of that business process.
Supply of Capability	The realisation of organisational capability through the practice of business processes.
Technology Affordances	A technology affordance represents the perception of what can be done with an item of technology by a user with a particular goal – i.e. the affordance is the potentiality for action of a technology feature.
Technology Improvisation	Those IT systems that are created to fill a perceived gap in existing IT capability.

12.5 Systems Dynamics Model



12.5.1 Definition of Behavioural Variables

Variable	Description
Need for Capability X	The demand for an organisational capability "X" emanating from the environment and creating a pressure to adapt.
Saturation of Capability X	How saturated the market is for the capability. This operates to dampen the demand driver.
Gap in Capability X	The gap between the need for the capability and the organisation's current capability. Behind this variable is the organisation a) detecting the market

Variable	Description
	demand, b) making strategic decisions to pursue, and c) being able to assess its own capability level.
Evolutionary Fitness of Capability X	How well the organisations' capability matches the context it is operating in, which is a function of the exogenous demand and also the technical fitness (Helfat et al. 2007)
Technical Fitness of Capability X	The internal measure of capability performance, e.g. in terms of unit cost or quality (Helfat et al. 2007).
Business Process Constraints	The amount of constraint that operates on the human participant in the business process in terms of their ability to achieve their goal. Examples of these in the case studies where the process complexity, the process compliance requirements and level of IT support for the process.
Business Process Improvisation	The level of deviation from the understood (ostensive) business process that occurs in the course of the performance of the business process by the human actor.
Technology Improvisation	The amount of improvised technology solutions that are developed to work around perceived technology constraints.
Technology Affordances	The level of technology functionality that is "useful" from the perspective of the user

13 Appendix 2 - Data Collection Instruments

13.1 Participant Information Sheet

INFORMATION SHEET

A FRAMEWORK FOR UNDERSTANDING THE ROLE OF BUSINESS-IT ALIGNMENT IN ORGANISATIONAL AGILITY

WHO IS DOING THE RESEARCH?

My name is Charles Crick and I am a PhD student²⁴ at the University of Technology, Sydney (My research supervisor is Prof. Eng Chew).

WHAT IS THIS RESEARCH ABOUT?

The research project is about the role Information Technology (IT) plays in enabling an organisation's business and its ability to adequately respond to the business environment (e.g. competition in the marketplace). In particular, we are seeking to understand the extent to which the *agility* of the organisation is related to the IT systems being used: whether they are an enabler or constraint on this agility.

The data for the research will be sourced primarily from interviews with staff from a series of case study organisations. Perspectives are being sought from executive management through to operational business staff.

IF I SAY YES, WHAT WILL IT INVOLVE?

You will be asked to participate in an interview of approximately one hour's duration with the researcher where he will seek your perspective on this problem area.

WHAT INFORMATION WILL BE GATHERED?

You will be asked for your view on a number of topics related to the type of business your organisation is in and how IT operates in your business. A sample list is provided below, but the questions will be tailored to suit your role in the organisation. The interviews will be recorded to enable detailed notes to be compiled outside of the interview. The recordings will be confidential and destroyed at the completion of the research. All information will be de-identified so that both individuals and organisations will not be identifiable in the published results.

²⁴ I am also employed (part time) by CSC (formerly Computer Sciences Corp.) as an IT consultant. This research is independent of my role at CSC.

ARE THERE ANY RISKS/INCONVENIENCE?

There are very few if any risks because the research has been carefully designed.

WHY HAVE I BEEN ASKED?

Your role in the organisation will be able to provide an important perspective on this problem area.

DO I HAVE TO SAY YES?

You don't have to say yes.

WHAT WILL HAPPEN IF I SAY NO?

Nothing. I will thank you for your time so far and won't contact you about this research again.

IF I SAY YES, CAN I CHANGE MY MIND LATER?

You can change your mind at any time and you don't have to say why. I will thank you for your time so far and won't contact you about this research again.

WHAT IF I HAVE CONCERNS OR A COMPLAINT?

If you have concerns about the research that you think myself or my supervisor can help you with, please feel free to contact me (us) on [REDACTED] (Charles) or 02 9514 4504 (Eng).

If you would like to talk to someone who is not connected with the research, you may contact the Research Ethics Officer on 02 9514 9772, and quote this number 2014000025

13.2 Sample Interview Questions

Organisation

General

- Your role?
- How large is the firm (Staff, Revenue etc.)?
- What is your Industry Sector?

Environment

- How competitive/dynamic is the business environment? Has this changed?
- What external business pressures does the organisation have to respond to?
- How do you rate the organisation's "market facing" agility - its ability to respond to change required by market?
- How do you rate the organisation's "operational" agility - its ability to redesign its business processes and/or redeploy its resources?
- How do you detect new opportunities in marketplace?

IT Investment

- How well defined and communicated is the IT strategy?
- What objectives are being pursued in the IT strategy?
- Where is the IT investment being targeted?
- What IT sourcing strategy is being pursued?

Org Structure

- What level do you report at in the organisation (e.g. with CEO being level 1)?
- How many direct reports do you have?
- How is your organisation structured - e.g. Product specialised, functional or process oriented?
- How often does the organisational structure change? Why?

Organisational Capabilities

Strategic Alignment

- What type of business strategy are you pursuing? (e.g. in terms of value discipline etc.)
- How well aligned are business and IT strategies?
- What are your organisation's core capabilities (competencies)?
- Is your business changing, requiring new capabilities (products)?
- What unique knowledge is being applied by the capability?
- What timeframes are regarded as "strategic" for the organisation?

Performance measurement

- How do you measure performance of your core capabilities (e.g. Time, costs, productivity, quality, and capital)?

Business Processes

Process Governance

- Are there process owners?
- Who is the process design authority?

Process Operations

- How does continuous process improvement occur?
- How experienced are users with the business processes? Are there special skills required?

Process Definition

- Are the processes standardised? Which ones?

Process-Technology Fit

Digitisation

- What is the extent of digitization of the business? Which business processes? Are these business processes stable or changing?
- To what extent are the core capabilities or the firm digitised?
- What types of IT systems are involved in the digitised business?
- How easy is it to change the way the systems features work to support the business?
- Which processes or process steps are not automated? Why?
- How often do the IT systems need to change? What type of changes?

Socio-technical fit

- What degree of generalist vs specific skills are required in the business processes? Which business processes?
- How experienced are the users with IT systems?
- What constraints operate on the use of the IT systems? (e.g. location: office vs mobile, user skills, technology, usability)
- To what extent are power users or "gurus" in the various IT systems important to the running of the business processes? Which types of system and/or processes?

13.3 Initial Letter Soliciting Participation

Hi <Addressee>

I'm a PhD student at the University of Technology, Sydney (UTS). As part of my research project, I am seeking access to some of the staff in your organisation to participate in some interviews.

My research is looking into how an organisation uses Information Technology (IT) to support the delivery of its services or products, and the relationship this has to the overall agility of the organisation - or in other words, its ability to adapt to change in its environment, or marketplace. This study is focusing on the core competencies of the business, those that define what the organisation does to "earn its living" and which are a source of competitive advantage.

I'm using interviews with staff in various case study organisations, in different industries, as the primary source of empirical research data. To be a candidate for the case study requires that the organisation: a) conducts its business in a dynamic, competitive marketplace that requires agility, and b) uses IT in a significant way as an enabler of its business.

I have identified <Your Company> as a potential candidate based on what I know about the dynamics of the <Industry Sector> industry, and the use of IT. I would, therefore, like to request access to some staff in your organisation to participate in some interviews. As a guide to the scope, I would be looking to interview across the executive, operations management and operational staff levels, possibly two at each level. Here "operational" means the part of the business that is involved in the delivery of the organisation's core competencies, those that define it as, say, a <Industry Sector> company, as opposed to back office functions such as finance and HR. I'm also interested in talking to someone from the CIO's office. In total, I would envisage between 6 and 10 one hour interviews. Precisely "who" and "when" of course would need to be discussed and planned in more detail.

The research has UTS ethics committee approval, which requires informed consent, and that I de-identify all participants and the organisations taking part. Thus <Your Company> would appear as "a <Industry Sector> company" in the results. I will also sign any non-disclosure agreement you may require. As a participating organisation, I am happy to provide access to the case study report which may be of interest, even though it will be limited in any conclusions it draws as it represents research-in-progress.

I have a more detailed information sheet attached. In the first instance, I am seeking a meeting to explain the requirements in more detail and hopefully nominate some interviewees.

I hope you will be able to assist in this topical research area.

Regards

13.4 Research Flyer

This flyer was sent out to enlist participants in the research project for Case study 2 – SupaMart. The information has been deidentified. Google Forms was used to gather the responses.

Is Information Technology constraining [SupaMart's] agility in the marketplace?

Would you like to be part of leading edge research investigating the role Information Technology (IT) plays in enabling an organisation's ability to adequately respond to its business environment? Is IT an enabler or constraint on agility?

We are seeking input from senior managers at [SupaMart] to help answer these questions.

Why you should participate

- q This subject is topical and important to [SupaMart] as it faces a dynamic marketplace and seeks innovative IT solutions to better enable its business
- q It presents an opportunity to have an experienced, independent set of eyes assess [SupaMart's] use of IT from a business perspective
- q At a wider level, this research aims to develop new insights into the complexities of the business-IT relationship in modern commercial organisations, with the ultimate aim of finding practical principles and guidelines to assist management.

What is involved

- q The researcher, Charles Crick, will conduct one-on-one interviews of 30 -60min with nominated representatives across business and IT within [SupaMart] Supermarkets line of business.
- q A case study report will document the findings and interpretations, based on the data collected
- q In line with UTS ethics approval, all information provided to be held securely and de-identified (both at an individual and organisational level) in any published results
- q Further information is available [here](#) or from either of the contacts below.

Please click [here](#) if you're willing to participate

Contact : Charles Crick ([bio](#))
PhD candidate (UTS)
charlescrick@computer.org



14 Appendix 3 - Causal Loop Diagramming Notation

The systems dynamics approach of causal loop diagramming (Senge 1990) has been used as a tool for describing the dynamic behaviour of the organisation as a system of adaptive components. This appendix is provided as a quick reference to the conventions of this diagramming method.

Causal loop diagrams have two main components:

- Variables - these are quantities of interest within the domain that exhibit the dynamic behaviour under study.
- Arrows showing the consequence of a change in a variable. The polarity of these arrows describes the downstream effect of the change (i.e. positive or negative) on an associated variable. When there is a significant delay between a change in a variable and its consequent effect, this is shown on the arrow using a double bar “||” notation.

Loops that occur in the diagram indicate feedback that can take one of two forms:

- *Reinforcing*, where there is a mutually reinforcing “vicious cycle” between variables, as in the example in Figure 23 (a) below. This is notated with an “R” inside a loop icon. Note the direction of the loop icon is arbitrary.
- *Balancing*, where there is goal-seeking behaviour that seeks to stabilise the variables taking part. The example in Figure 23 (b) shows the classic predator/prey relationship that exists in a stable ecosystem. This is notated with a “B” inside a loop icon.

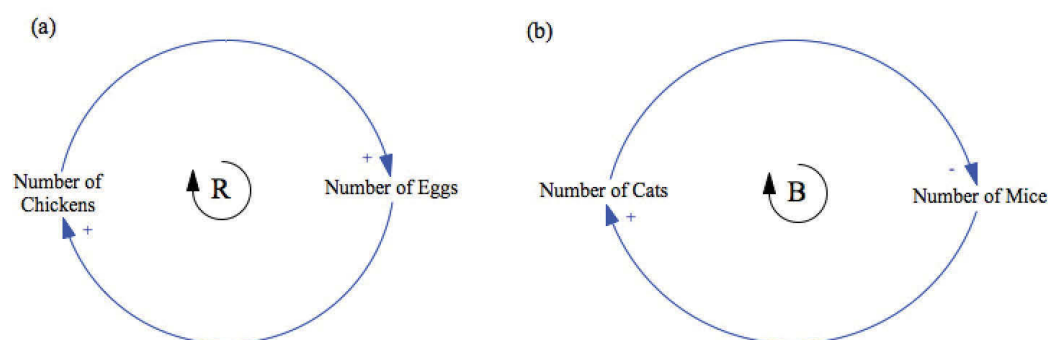


Figure 23 - Example of reinforcing and balancing feedback loops

15 Appendix 4 - Published Research Papers

This section includes the final accepted manuscript versions of the published research papers.

Paper 1: ICEIS 2014

Crick, C. & Chew, E., 2014, 'Understanding the role of business-IT alignment in organisational agility', in S. Hammoudi, L. Maciaszek, & J. Cordeiro (eds) *Proceedings of the 16th International Conference on Enterprise Information Systems, ICEIS 2014*. SCITEPRESS.

Understanding the Role of Business – IT Alignment in Organisational Agility

Charles Crick and Eng Chew

Faculty of Engineering and Information Technology, University of Technology, Sydney, Australia

Keywords: Business-IT Alignment, Socio-technical Systems, Organisational Agility.

Abstract: Extant research shows business-IT alignment to be both an enabler and inhibitor of overall organisational agility and has pointed to the need for finer grained perspectives to fully elucidate the relationship. This paper posits the view that, firstly, current approaches to reasoning about where rigidities are present that are preventing organisational agility are lacking in both granularity and sound ontology. Secondly, that in order to obtain the necessary granular view, the socio-technical dimension of the business-IT relationship must be examined. An initial conceptual model behind ongoing research into this topical problem area is presented.

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Crick, C. & Chew, E., 2014, 'Understanding the role of business-IT alignment in organisational agility', in S. Hammoudi, L. Maciaszek, & J. Cordeiro (eds) *Proceedings of the 16th International Conference on Enterprise Information Systems, ICEIS 2014*. SCITEPRESS.

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Paper 2: BPMDS 2014

Crick, C. & Chew, E., 2014, 'Towards a consistent cross-disciplinary ontology for business process', in I. Bider et al. (eds) *Enterprise, Business-Process and Information Systems Modeling (BPMDS 2014)*. Springer, Berlin Heidelberg, pp. 230–241.

Towards a Consistent Cross-Disciplinary Ontology for Business Process

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Abstract. This paper takes a cross-disciplinary view of the ontology of “business process”: how the concept is treated in the IS research literature and how related concepts (with stronger human behavioural orientation) from organisational and management sciences can potentially inform this IS perspective. In particular, is there room for socio-technical concepts such as technology affordance, derived from the constructivist tradition, in improving our understanding of operational business processes?

The paper draws on the current research being pursued by the authors in developing a theoretical framework for understanding the role of IT in organisational agility. In this developing theoretical model, we are seeking to include the user-oriented socio-technical dimension that distinguishes the IT “as-used” from the IT “as-designed” in our use of business process as an organisational building block.

Keywords: Ontology, Business Process, Organisational Routine, Technology Affordance, Organisational Capability

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Crick, C. & Chew, E., 2014, 'Towards a consistent cross-disciplinary ontology for business process', in I. Bider et al. (eds) *Enterprise, Business-Process and Information Systems Modeling (BPMDS 2014)*. Springer, Berlin Heidelberg, pp. 230–241.

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Paper 3: SoSyM Journal

Crick, C. & Chew, E., 2015, 'Business Processes in the Agile Organisation: A Socio-Technical Perspective', *Software and Systems Modeling* pp. 1–18.

Business Processes in the Agile Organisation: A Socio-Technical Perspective

Keywords: Socio.technical Systems, Organisational Agility, Business Process, Technology Affordance

Abstract: This paper takes a cross2disciplinary view of the ontology of “business process”: how the concept is treated in the IS research literature and how related concepts (with stronger human behavioural orientation) from organisation and management sciences can potentially inform this IS perspective. In particular, is there room for socio2technical concepts such as technology affordance, derived from the constructivist tradition, in improving our understanding of operational business processes, particularly human2centric business processes? The paper presents a theoretical framework for understanding the role of business processes in organisational agility that distinguishes between the process2as2designed and the process2as2practiced. How this practice aspect of business processes also leads to the improvisation of various information technology enablers, is explored using a socio2technical lens. The posited theoretical framework is illustrated and validated with data drawn from an interpretive empirical case study of a large IT services company. The research suggests that processes within the organisation evolve both by top2down design and by the bottom2up routinization of practice and that the tension between these is driven by the need for flexibility.

Introduction

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Crick, C. & Chew, E., 2015, 'Business Processes in the Agile Organisation: A Socio-Technical Perspective', *Software and Systems Modeling* pp. 1–18.

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Paper 4: IWEI 2015

Crick, C. & Chew, E., 2015, 'Introducing a Socio-Technical Perspective on Business Processes into Enterprise Interoperability Frameworks', in M. van Sinderen & V. Chapurlat (eds) *Enterprise Interoperability (IWEI 2015)*. Springer, Berlin Heidelberg, pp. 83–91.

Introducing a Socio-Technical Perspective on Business Processes into Enterprise Interoperability Frameworks

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Abstract. This paper looks at enterprise interoperability (EI), specifically process-level interoperability, and suggests that the inherent non-determinacy of human-centred business processes introduces another ingredient into the EI puzzle that has thus far been understated in EIF ontologies. A conceptualisation of business process based on socio-technical concepts is presented. It is argued that this provides a better way to accommodate human agency factors, and under the influence of these factors, how business processes inevitably evolve over time, potentially affecting their interoperability. We suggest the extant body of knowledge on the theory of dynamic capabilities is relevant to understanding how organisations can control this potentially undirected process evolution and thereby sustain interoperability. Some initial observations are made concerning how this new ontological element could be accommodated into existing EIFs. The paper aims to stimulate discussion in this area and make a contribution to the EI body of knowledge.

Keywords: Socio-technical systems • Business process ontology • Technology affordance • Enterprise interoperability • Dynamic capabilities

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Crick, C. & Chew, E., 2015, 'Introducing a Socio-Technical Perspective on Business Processes into Enterprise Interoperability Frameworks', in M. van Sinderen & V. Chapurlat (eds) *Enterprise Interoperability (IWEI 2015)*. Springer, Berlin Heidelberg, pp. 83–91.

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