DYNAMIC INFORMATION TECHNOLOGY CAPABILITIES

DYNAMIC IT CAPABILITIES: THEORY DEVELOPMENT AND EMPIRICAL EXAMINATION

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ABSTRACT

This thesis examines *dynamic IT capabilities:* firms' abilities to integrate, build, and reconfigure information technology resources concurrently with organizational business process and managerial processes in pursuit of performance advantages in a changing or uncertain environment. Research in dynamic IT capabilities has increased with the recognition that organizational survival and growth requires organizational change to resolve a range of management challenges that emerge over time. In prior research, specific constructs of dynamic IT capabilities have been the subject of independent empirical investigation. This has resulted in conflicting conceptualizations of dynamic capabilities that obfuscate theoretical definition, empirical grounding and measurement. We seek to contribute conceptual coherence to the discourse on dynamic IT capabilities in three respects. First, we advance a theoretical framework to tease apart the common versus idiosyncratic elements of firms' dynamic capabilities to *exploit* IT in practice. Our empirical findings serve to integrate conflicting (common versus idiosyncratic) conceptualizations of dynamic IT capabilities. Second, we advance a theoretical framework of firms' dynamic capabilities to *explore* for IT innovations that are likely to improve firm performance. To that end we examine CIOs' use of external advice networks to mindfully identify rewarding IT innovations. In so doing we clarify the concept of mindfulness. We find mindful external advice seeking is atypical in practice, contrary to assumptions of the technology diffusion and institutional literatures. Our empirical findings elucidate the significance of IT governance in motivating mindful search for rewarding IT innovations. Third, we demonstrate the importance of qualitative and configurational methodologies in investigating such complex phenomena as dynamic IT capabilities. We also propose promising future research directions, theoretical grounding and analytical techniques that, by building on the concepts advanced in this study, can further advance our understanding of how firms acquire and realize dynamic IT capabilities in support of sustained performance advantages.

DEDICATION

To Sharol, Ciara, Liam and family for inspiration, and to God for purpose.

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This dissertation would not have been possible without the apprenticing and mentoring of my PhD supervisor, Prof. Ali Reza Montazemi, whose dedication to helping me learn the highest standards of scholarship and teaching was manifest in regular communication, tutelage and counsel that extended well beyond the strict call (and hours) of duty. I am also grateful to my supervisory committee members, including Prof. Isik Zeytinoglu, who patiently advised, counselled and taught me in research protocol and proposal writing, and Prof. Joseph Tan, whose encouragement and constructive critical insights helped to shape this and prior research. I am also grateful to a colleague, Hamed Qahri Saremi, for friendship, counsel and many hours of stimulating intellectual debates that were one of the most enjoyable aspects of PhD studies.

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LIST OF ALL ABBREVIATIONS AND SYMBOLS

Alpha…Lambda	Pseudonyms for local governments interviewed in Part 1
CAD	Dollars, Canadian
CAO	Chief Administrative Officer
CEO	Chief Executive Officer
CIO	Chief Information Officer (or IT director)
ERP	Enterprise Resource Planning (enterprise system)
H*n*	Hypothesis number *n*
IT	Information technology
MISA	Municipal Information Systems Association
OSR	Own Source Revenues
RBV	Resource-based view
ROA	Return on Assets
ROI	Return on Investment
RQ*n*	Research question number *n*
●	Core causal condition (attribute present)
•	Peripheral causal condition (attribute present)
⊗	Core causal condition (attribute absent)
⊗	Peripheral causal condition (attribute absent)

DECLARATION OF ACADEMIC ACHIEVEMENT

My supervisor, Ali Reza Montazemi, and myself designed the research conducted in this dissertation. In recognition of this fact of dissertation research, I have chosen to use the personal pronoun "we" where applicable throughout the dissertation. Nonetheless, this dissertation represents original research that I conducted as follows. With the advice and guidance of Prof. Montazemi I conducted literature reviews, proposed theoretical frameworks and hypotheses, and prepared the ethics approval applications for the empirical research protocols (which were subsequently approved). I performed recruiting, interviews and both qualitative and quantitative data gathering for all participants in both Part 1 and Part 2 field research. I performed all analyses. I wrote the manuscript with the editorial advice and supervision of Prof. Montazemi. Earlier drafts of parts of this research have been presented at international academic workshops as part of the manuscript's development.

1.0 INTRODUCTION TO DISSERTATION

Information technology (IT) has long been proposed as a key enabler of organizational capabilities in support of performance advantages for the firm (e.g., Mata et al. 1995). In pursuit of performance advantages, many organizations have adopted Enterprise Resource Planning (ERP), which refers to IT that, when implemented across an enterprise, provides a standard platform for administrative functions that enables real-time integration of cross-functional business processes (Ranganathan and Brown 2006). To the extent that these integration efforts are successful, organizations should exhibit performance advantages such as improved operating efficiencies. Yet it is revealed that IT does not always lead to performance advantages. For example, research shows how, as a result of bandwagon pressures, firms tend to adopt ITs for which costs exceed payoffs (Greve 2011). Numerous studies examining the business value of IT have argued and shown that ITs *can* contribute to improved firm performance to the extent that IT is used in support of operational capabilities (Melville et al. 2004; cf. Brynjolfsson et al. 2002; Dewan and Kraemer 2000; Kohli and Devaraj 2003). Operational capability refers to the organizational capability to perform particular tasks or activities that earn a living in the present (Helfat et al. 2007). However, operational capability can become irrelevant and a source of rigidity or *inertia* when the environment changes (Leonard-Barton 2007; Wang et al. 2012). Organizations succumb to inertia when they limit their efforts to exploiting operational capabilities (Jansen 2004; Teece 2007). In this case they recurrently enact structures and routines over time that are not aligned with new behaviours made necessary by changing environmental demands, and which unnecessarily constrain interactions and behaviours. They also tend to frame new problems in a manner consistent with the organization's pre-existing knowledge base, assets, and/or established problem-solving heuristics. This effect makes it difficult for the organization to see the potential payoffs of innovations that emerge in the industry. Once-functional routines become dysfunctional, providing rigidities that stand in the way of improved firm performance. Whereas the organization may generate payoffs for a short period, it cannot sustain performance advantages for long periods. Except in very stable environments, operational capabilities are likely to require constant redesign and reconfiguration if the firm is to realize sustained performance advantages. For this reason, organization, management and information systems researchers have devoted increasing attention to studying a higher order set of organizational capabilities called *dynamic IT capabilities* (Lim et al. 2011).

1.1 Dynamic IT Capabilities

Dynamic capabilities have come to refer to a higher order capability to integrate, build and reconfigure organizational resources and organizational routines in pursuit of performance advantages in a changing or uncertain environment (Barreto 2010; e.g., Eisenhardt and Martin 2000; Teece et al. 1997; Zollo and Winter 2002). Capabilities are high-level collections of routines directed toward attaining specific goals, where routine refers to behaviour that is collective, structured, repetitious or quasi-repetitious (Pavlou and El Sawy 2011; Winter 2003). Consistent with this definition *dynamic IT capabilities* can be defined as a firm's ability to (1) integrate, build, and reconfigure IT resources concurrently with (2) organizational business process and (3) managerial processes (4) in pursuit of performance advantages in a changing or uncertain environment (Lim et al. 2011). Although both operational and dynamic capabilities are collections of routines, dynamic capabilities describe the ability to reconfigure and change, whereas operational capabilities denote the ability to 'make a daily living' (Winter 2003). The distinction between operational capabilities and dynamic capabilities is important because, as the empirical record shows, it is the dynamic organizational capability to *integrate, build and reconfigure* IT resources that can help organizations in uncertain environments to realize sustainable performance advantages (Drnevich and Kriauciunas 2011). The basic rationale is that resources are the foundation of a firm and the basis for firm capabilities, the so-called 'zero-order' element in the creation of business value (Agarwal and Selen 2009; Pavlou and El Sawy 2010; Wang et al. 2012; Winter 2003). Operational capabilities are 'first-order' and refer to a demonstrated ability to deploy and use resources. Dynamic capabilities are higher order capabilities that emphasize a firm's constant pursuit of the renewal, reconfiguration and re-creation of resources and operational capabilities to address environmental change. Whereas firms can gain performance advantages in stable environments by picking appropriate resources and deploying resources to attain a desired goal, they require dynamic capabilities to sustain higher performance when the environment becomes more unpredictable (Wang et al. 2012). Hence research is urgently required that proposes and systematically shows under which conditions firms achieve reconfiguration of resources and operational capabilities and higher levels of performance (i.e., dynamic IT capabilities) (Barreto 2010), which is the focus of this research.

1.2 Multiple Constructs from Multiple Streams of Research

Dynamic capabilities consist of identifiable and specific constructs at multiple levels of analysis that have often been the subject of extensive empirical research in their own right (Eisenhardt and Martin 2000). The constructs can be classified

broadly as specific to the focal firm context and to the external institutional and industry environment (Lewin et al. 2011) as depicted in Figure 1.1 and elaborated next.

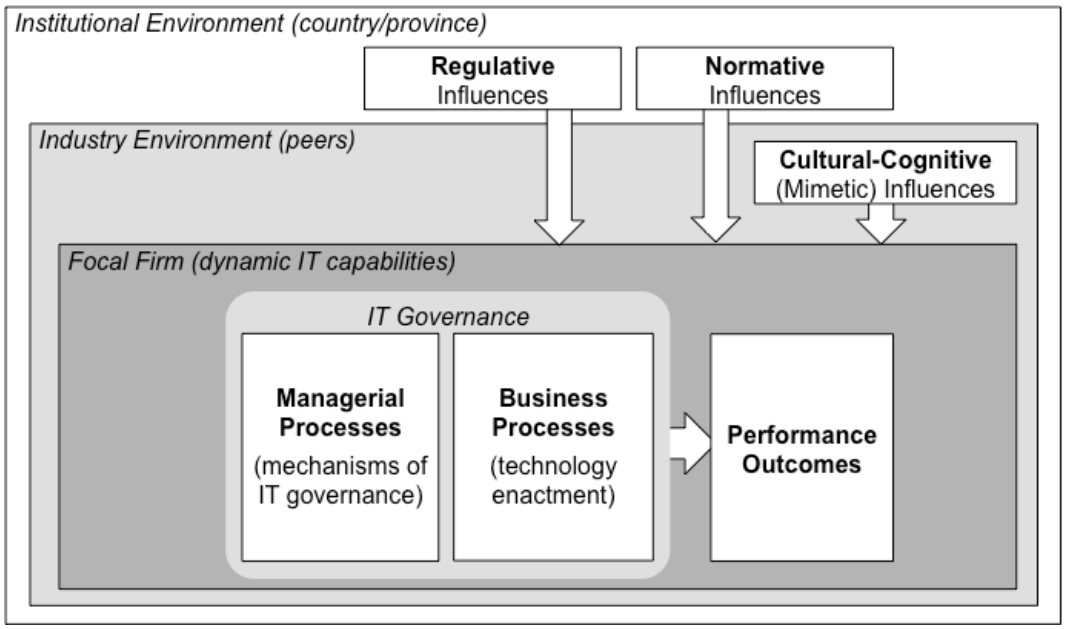

Figure 1.1 Research Framework: Context-contingent view of dynamic IT capabilities

Research into constructs at the *macro* (country/province) level and the *industry* level conceptualizes the firm as suspended in a web of values, norms, beliefs, and taken-for-granted assumptions (e.g., Lewin et al. 2011;Melville et al. 2004; Mignerat and Rivard 2009). These values, norms, beliefs and assumptions arise from the existence of institutions that guide and constrain their actions over time. An institution is a social structure that gives actors and organizations courses of action or orientations, yet at the same represents constraints on the options that actors and organizations are likely to exercise, albeit constraints which are open to modification over time. More specifically, institutionalists contend that organizational strategies for improving firm performance are both influenced by and carriers of the institutional characteristics of firms' embedding environments. For example, in their comprehensive examination based on institutional theory, Scott et al. (2000) trace major transformations in California's public service over a century and contend that exogenous *regulative* influences – the first institutional dimension – imposed by higher-tier governments, and exogenous changes in citizens' *normative* expectations – the second institutional dimension – for public service delivery explain significant contemporaneous changes in service delivery models adopted by firms delivering public services. Furthermore, as peer firms

adopt a given technology or strategic initiative, exogenous bandwagon pressures mount on late adopters to *mimic* their peers and adopt the IT or strategy, which is a *cultural-cognitive* influence that constitutes the final institutional dimension (DiMaggio and Powell 1983; Fiol and O'Connor 2003; Mignerat and Rivard 2009; Swanson and Ramiller 2004).

Research into constructs at the *focal firm* level emphasizes (1) managerial processes, (2) organizational business processes, and (3) firm performance outcomes. Managerial processes and organizational business processes that ensure that the firm's IT supports achievement of strategic objectives (i.e., improved firm performance) comprise firms' *IT governance* (Gottschalk 2007). IT governance has come to mean the selection and use of mechanisms for obtaining the required IT competencies to support and shape business strategy (Alaghehband and Rivard 2010). For example, the formal distribution of decision rights and accountabilities for IT-related strategic decisions is a well-recognized mechanism used in IT governance (Weill and Ross 2004). IT governance is important because it is "the single most important predictor of the value an organization generates from IT" (Weill and Ross 2004, pp. 3-4). The recurrent patterns in how organizational actors actually use IT in support of organizational business processes is conceptualized as *technology enactment* (Boudreau and Robey 2005; Cordella and Iannacci 2010; Fountain 2001; Gil-Garcia 2006), where recurrent patterns today have developed within the context of the focal firm over time. The *managerial processes* of dynamic capabilities also developed within the context of the focal firm over time and can be disaggregated into the capacity (1) to sense and shape opportunities and threats (i.e., exploratory dynamic capabilities), and (2) to sustain above-average firm performance through enhancing, combining, protecting, and, when necessary, reconfiguring the business enterprise's intangible and tangible assets (i.e., exploitative dynamic capabilities, Teece 2007). As elaborated next, important questions regarding both exploitative and exploratory elements of dynamic capabilities remain unanswered in the literature.

1.3 Research Questions

Our first research question pertains to the idiosyncrasies and the commonalities of dynamic IT capabilities; specifically the *exploitative* elements of dynamic capabilities by which firms sustain above average firm performance through enhancing, combining, protecting, and, when necessary, reconfiguring business processes. Two diverging views can be observed in the literature regarding assumptions about firms' degree of commonality in their dynamic capabilities. The lack of integration between the two views has resulted in conceptualizations of dynamic capabilities that obfuscate the definition, empirical grounding and measurement of dynamic capabilities (Williamson 1999). On one hand, research

in the resource-based view (RBV) – in which resources that are valuable, rare, inimitable, and non-substitutable infer competitive advantage on the firm – emphasizes aspects of dynamic capabilities that are essentially firm specific and unique (Barreto 2010). These characteristics result from firms' idiosyncratic path-dependent histories of investments and commitments to the creation and development of dynamic capabilities. On the other hand, researchers have asserted that dynamic capabilities also exhibit commonalities across firms because 'best practice' exists for particular dynamic capabilities across firms (Eisenhardt and Martin 2000). These commonalities imply that firms can develop dynamic capabilities from many starting points and along different paths, but some aspects of their dynamic capabilities will be relatively homogeneous. We seek to contribute conceptual coherence to the divergent literature by identifying *(RQ1) which elements of firms' dynamic IT capabilities are common and which elements are idiosyncratic in explaining variations in IT impacts on firm performance*, which is the research question for Part 1 of this research.

Our second research question pertains to *exploratory* elements of dynamic IT capabilities, specifically the capacity for firms to sense and shape opportunities and threats (Teece 2007) pertaining to innovative IT and strategic IT initiatives that emerge in the environment. Research into this aspect of dynamic IT capabilities is concerned with mimetic behaviours, in which firms are driven by the need for legitimacy and improved firm performance to mimic the choices (e.g., IT acquisitions) and strategies (e.g., strategic IT initiatives) of ostensibly higher performing firms in their industry (Wolf et al. 2012). On one hand, as we will elaborate in Part 2 of this research, mimetic behaviour can be a highly rational approach to improving firm performance to the extent that CIOs are mindful (i.e., critical and discriminating) in their search for information from peer firms regarding the likely payoffs and costs of implementation in the context of their own (focal) firm. On the other hand, mimetic behaviour can be irrational or 'less-mindful' toward the interests of the firm. In this case, IT innovations for which costs exceed payoffs for the majority of adopters propagate among peer firms in an industry (e.g., Greve 2011). Whereas it is in the best interests of firms that their CIOs mindfully seek advice from peers regarding the likely payoffs versus costs of implementing an IT or strategic IT initiative, we show that CIOs are not necessarily motivated to do so. Therefore, Part 2 of this research focuses on our second research question *(RQ2) (i) do CIOs seek advice from peer firms, and (ii) how can firms' IT governance motivate CIOs to mindfully seek advice in their external advice networks?*

1.4 Epistemological Perspective

Our approach to examining the two research questions is informed by an integrated interpretive and positivist perspective (Lee 1991), and this integrated epistemological perspective informs both our research design and the two-part structuring of this dissertation as follows.

On one hand, the interpretive perspective in organizational research maintains that the positivist methods of natural science are inadequate on their own for the study of social reality because actors, and the social artefacts that they create, are fundamentally different from the physical reality examined by natural science (Lee 1991). Unlike atoms and electrons in the natural world, actors create and attach their own meanings to the world around them and to the behaviours that they manifest in that world (Schutz 1954). In other words, the same institutions and behaviours can have different meanings for different actors, as well as for the observing social scientist. Hence, the observing social scientist should interpret this empirical reality in terms of *what it means to the observed subjects*. It is because of this attention to the interpretations of subjects that the interpretive approach is said to take a "subjective" view (Lee 1991). To that end, social scientists should gather data describing not only the purely objective, publicly observable aspects of subjects' behaviours, but also the subjective meaning this behaviour has for the subjects themselves.

On the other hand, research methodologies in the positivist perspective enable social scientists to satisfy the four requirements for a theory: falsifiability, survival, logical consistency, and relative explanatory power (Lee 1991). Falsifiability is satisfied through formal propositional statements of logical relationships that are sufficiently specific (i.e., hypotheses) that they could be falsified by disconfirming empirical evidence. While falsifiable, a theory must survive the actual attempts aimed at its disconfirmation through controlled empirical testing. Logical consistency is satisfied when a theory's propositions are validated by the rules of formal logic through controlled empirical testing using mathematics (i.e., statistics). Finally, relative explanatory power is satisfied if a theory is able to explain, or predict, the subject matter as well as any competing theory (as applicable).

The relative strengths of both interpretive and positivist approaches to organizational research are combined in a single overarching framework advanced by Lee (1991), which consists of three "levels of understanding" as follows.

> "The understanding at the first level belongs to the observed human subjects. This understanding consists of the everyday common sense and

everyday meanings with which the human subjects see themselves, and which give rise to the behaviour that they manifest in socially constructed settings. The understanding at the second level belongs to the observing organizational researcher. This understanding is the researcher's reading or interpretation of the first-level, common-sense understanding... The understanding at the third level also belongs to the organizational researcher. This understanding is one that the researcher creates and tests in order to explain the empirical reality that he or she is investigating. This explanation, which is also called scientific theory, is made up of constructs that belong exclusively to the observing researcher (as opposed to the observed human subjects). The explanation consists of formal propositions that typically posit the existence of unobservable entities (like social structure)… The three levels of understanding will be called, respectively, the subjective understanding, the interpretive understanding, and the positivist understanding." (Lee 1991, p. 351).

1.5 Structure and Contributions of Dissertation

The logical flow of Lee's (1991) integrated interpretive and positivist approach to organizational research is depicted in Figure 1.2. It provides the overall framing for the structure of this dissertation and for our methodological choices. Specifically, data for our study will be collected through a combination of interpretive case studies in Part 1 and a positivist approach based on a nation-wide survey of Canadian local government organizations in Part 2, as follows.

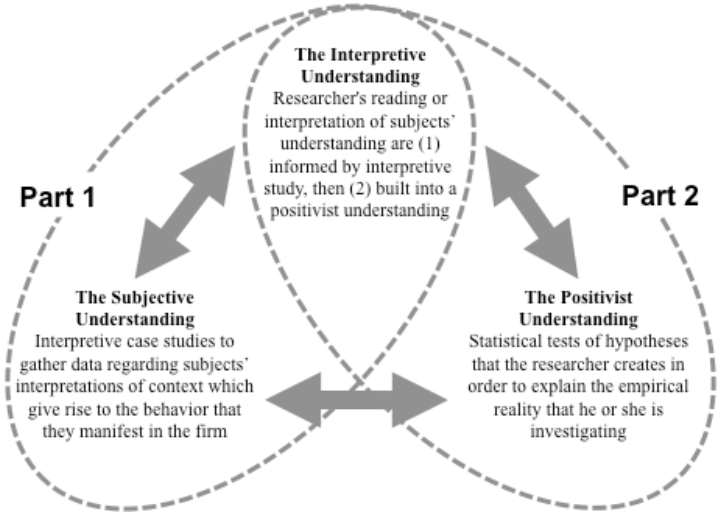

Figure 1.2 Framework for integrated positivist and interpretive approaches to organizational research (adapted from Lee, 1991)

PART 1

EXPLOITATIVE DYNAMIC IT CAPABILITIES: THE SIGNIFICANCE OF IT GOVERNANCE

2.0 INTRODUCTION TO PART 1

The relationship between information technology (IT) and firm financial performance is a crucial research issue that symbolizes the value of information systems research (Kim et al. 2011). The basic intuition of this literature is that strategic IT investments and initiatives lead to IT impacts, and IT impacts to firm financial performance (Melville et al. 2004; Tallon and Pinsonneault 2011). In pursuit of performance advantages, many firms have adopted "ERP", which refers to IT that, when implemented across an enterprise, provides a standard platform for administrative functions that enables real-time integration of cross-functional business processes (Ranganathan and Brown 2006). Organizations should exhibit performance advantages such as improved operating efficiencies to the extent that integration efforts are successful. The literature examining IT impacts has, therefore, been concerned with questions of why different firms derive different performance advantages from IT.

One school of thought contends that differences in performance outcomes of IT investments can be explained by the uncertainty caused by changes in firms' environments. Research in this view conceptualizes the firm as suspended in a web of values, norms, beliefs, and taken-for-granted assumptions (e.g., Lewin et al. 2011;Melville et al. 2004; Mignerat and Rivard 2009; Peppard and Breu 2003). These values, norms, beliefs and assumptions arise from the existence of institutions that guide and constrain their (IT-enabled) actions over time. Institutions refer to *regulative* influences imposed by higher-tier governments, societal *normative* expectations, and bandwagon or *mimetic* pressures to adopt popular technologies or strategic initiatives (DiMaggio and Powell 1983; Fiol and O'Connor 2003; Mignerat and Rivard 2009; Scott et al. 2000). The extant literature contributes to our understanding of how changes in exogenous institutions constrain the strategic choices and behaviours of individual firms in an industry and hence affect firm performance. Such exogenous explanations cannot, however, explain variance in performance among firms that are subject to the same regulative and normative pressures and have acquired similar or substitutable technological resources (Teece 2007). It is here that differences in firms' dynamic capabilities are thought to come into play.

A synthesis of definitions from the extant literature shows that dynamic capabilities have come to refer to: a higher order capability to integrate, build and reconfigure organizational resources and organizational routines in pursuit of performance advantages in a changing or uncertain environment (Barreto 2010; cf. Eisenhardt and Martin 2000; Teece et al. 1997; Zollo and Winter 2002). Capabilities are high-level collections of routines directed toward attaining

specific goals, where routine refers to behaviour that is collective, structured, repetitious or quasi-repetitious (Pavlou and El Sawy 2011; Winter 2003). Consistent with this definition *dynamic IT capabilities* can be defined as *a firm's ability to (1) integrate, build, and reconfigure IT resources concurrently with (2) organizational business process and (3) managerial processes (4) in pursuit of performance advantages in a changing or uncertain environment* (Lim et al. 2011). To the extent that dynamic IT capabilities are idiosyncratic, a firm that develops superior dynamic IT capabilities could gain a sustainable performance advantage over peers. The rationale is rooted in the resource-based view of the firm, which maintains that resources – including capabilities – that are valuable, rare, inimitable, and non-substitutable infer competitive advantage on the firm that cannot be easily eroded by imitation (Barreto 2010). However, other researchers have asserted that dynamic capabilities exhibit commonalities across firms. For example, Eisenhardt and Martin (2000) contend that 'best practices' for particular dynamic capabilities emerge and diffuse across firms. The contention has serious implications for discourse on dynamic IT capabilities because it suggests that firms can, to some extent, learn dynamic IT capabilities from their peers. Yet, dynamic IT capabilities should retain some idiosyncratic elements if they are to afford performance advantages to individual firms. The extant literature has not, however, teased apart these idiosyncratic versus common elements through systematic empirical research, and consequently we still do not know which capabilities can be learned from peers and which must be developed *in situ*. We seek to contribute to the literature by empirically identifying *(RQ1) which elements of firms' dynamic IT capabilities are common and which elements are idiosyncratic*, which is the research question for Part 1 of this research.

Based on the literature review and theoretical framework that follows, it is our contention in Part 1 of this research that attributes of the managerial processes, organizational business processes and firm performance outcomes that comprise firms' dynamic IT capabilities can be classified according to five states of capability maturity. These states, we will show, contribute conceptual coherence to the discourse on dynamic IT capabilities by elucidating elements that firms have in common, and elements that are idiosyncratic. To that end, we propose and empirically validate a states of capability maturity view of dynamic IT capabilities by demonstrating that (1) firms grouped *within* a state of technology enactment face *common* challenges that they address and resolve through changes in IT governance mechanisms, and (2) *between* firms grouped into different states of technology enactment, firms' have (a) *idiosyncratic* patterns of IT governance mechanisms and (b) *idiosyncratic* performance in terms of operating efficiency. The theoretical framework we advance and the empirical findings contribute conceptual clarity to the discourse on dynamic IT capabilities by elucidating

which elements of firms' dynamic IT capabilities are common and which elements are idiosyncratic, which has important implications for practitioners and future research.

3.0 LITERATURE REVIEW

To understand the importance of dynamic IT capabilities, one must keep in mind the central paradox of organizing. Organizing means routinizing (Besson and Rowe 2012). Yet routinization creates inertia by entrenching organizational practices (e.g., business processes) and causing practices to become rigid. Organizational inertia manifests, for example, in strong norms, obsolete practices embedded in legacy systems, overemphasis on exploiting existing resources and vested interests in legacy ways of operating that pre-empt search for innovative alternatives. In this perspective, a dynamic capability implies overcoming organizational inertia to adapt the organization to mitigate emerging threats (e.g., changing regulations, customer demands) and take advantage of emerging opportunities (e.g., innovative IT) in the environment. Top managers are regarded as coaches and champions for overcoming inertia (Jansen 2004). Their role is to create and maintain change readiness using a proactive orientation that influences the beliefs, attitudes, intentions and behaviours of the organizational actors that use IT in support of organizational business processes. Hence, dynamic IT capability is thought to be a function of firms' managerial processes and organizational business processes directed at improving firm performance (Lim et al. 2011; Teece 2007), which collectively define IT governance (Weill and Ross 2004). We elaborate both managerial and business process elements as follows.

First, the impact of IT use on business outcomes (e.g., operating efficiency) is enhanced when complemented by consonant design, planning, control and change *management processes,* which constitute *mechanisms of IT governance* (e.g., Baptista et al. 2010; Besson and Rowe 2012; Cordella and Iannacci 2010; Huang et al. 2010; Jun and Weare 2011; Ross et al. 2006; Tiwana and Konsynski 2010). For example, Gu et al. (2008) find that firms with consonant mechanisms of IT governance can obtain two to three times greater value from IT investments than firms without consonant mechanisms of IT governance.

Second, scholars argue that researchers need to investigate how actors enact technologies in support of *organizational business processes* via the practice perspective (e.g., Cresswell et al. 2008; Luna-Reyes et al. 2005), which is a meta-theoretic framework for understanding how organizations transform through actors' use of IT (Boudreau and Robey 2005; Orlikowski and Robey 1991). In the practice perspective, human actors draw upon organizational structure – constituted in patterns and conventions of interaction, activity and resource appropriation – in order to perform the activities that contribute to firm performance. Actors' deliberate actions are made possible because of the properties of the organization at actors' disposal, such as IT, hierarchies, policies

and norms of behaviour. In their patterns of *technology enactment* actors are guided by, for example, their subjective interpretations of organizational structure, such as corporate strategies and regimes of authority. Due to the subjectivity, IT will not always be used in ways envisioned by IT designers or intended by management. Actors can ignore certain properties of IT, work around them, or modify them to support old practices. Practices are also carried out against a background of rules and expectations that are shaped by the institutional context in which actors are embedded (Feldman and Pentland 2003; Lewin et al. 2011).

Prior research has established three exogenous institutional influences that constitute an embedding context for the enactment of IT in support of organizational business processes: regulative, normative and mimetic (i.e., cultural-cognitive) influences (Currie and Guah 2007; Hjort-Madsen 2007; Hossain et al. 2011; Mignerat and Rivard 2009). *Regulative* influences refer to dominant political/legal/regulatory constraints that influence the actions and behaviours of organizations. *Normative* influences refer to widely held societal expectations that validate specific organizations' behaviours in an industry as legitimate; i.e., as desirable and congruent with socially accepted goals and values. In turn, organizations endeavour to fulfil normative expectations by adopting practices employed by peer organizations (e.g., acquiring similar enterprise resource planning or "ERP" technologies) (Jun and Weare 2011). This imitative or *mimetic* behaviour is thought to arise from *cultural-cognitive* influences: i.e., socialized heuristics that serve as cognitive guides for action and behaviour, such as the notion that adoption of a particular innovation by similar organizations signals that the innovation is beneficial, and that non-adopters will be perceived negatively as laggards. Hence, prior research contends that the exogenous institutional influences of the focal firm’s embedding environments shape the endogenous institutionalisation of IT-enabled business processes.

4.0 THEORETICAL FRAMEWORK

Taken together, the foregoing literature is depicted as a theoretical framework in Figure 4.1, which states that a chosen IT *can* contribute to performance advantages for the firm (e.g., operating efficiencies), but the contribution depends on the focal-firm's managerial processes and IT-enabled organizational business processes (i.e., IT governance), as well as the external institutional and industry environment. We elaborate the constructs comprising the theoretical framework as follows.

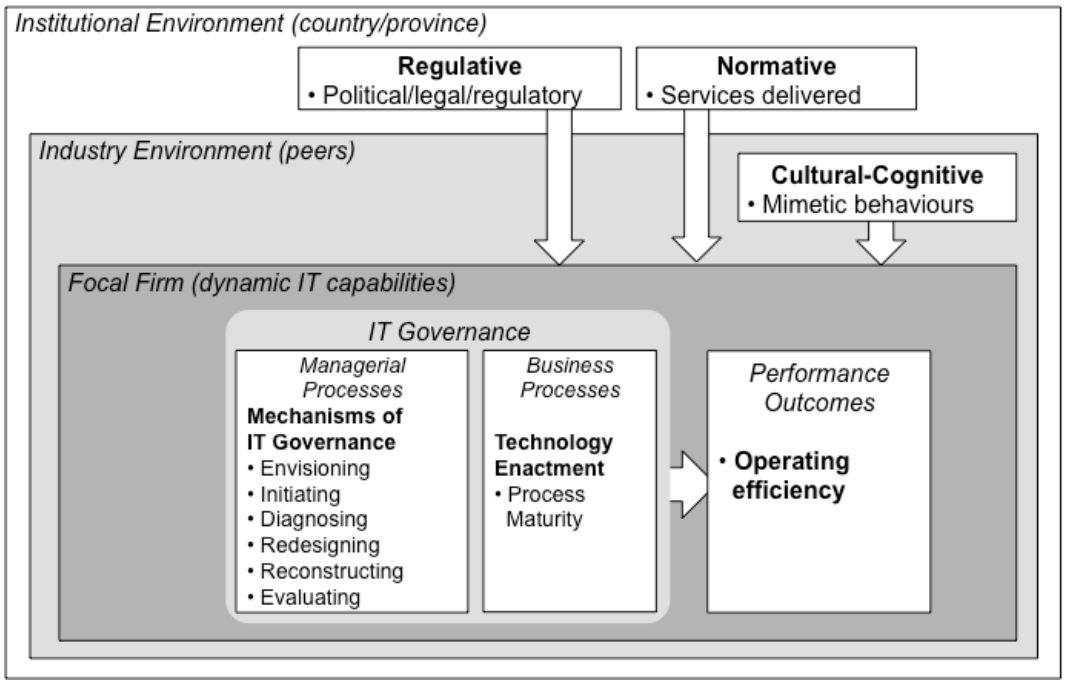

Figure 4.1 Context-contingent theoretical framework of dynamic IT capabilities

Survival and growth in uncertain environments brings a range of management challenges (Gladwell 2000; Phelps et al. 2007). As environmental demands change and as firms increase in complexity, managers encounter a number of problems for which more sophisticated capabilities are required. These encounters are recognizable as 'tipping point' challenges. Tipping points are encountered during growth or are the consequence of environmental changes, and will depend on the specific context of the firm in its environment. To continue growing, a firm must successfully resolve the challenges presented by the tipping point. Encountering and resolving tipping points does not imply a linear, sequential, deterministic or invariant set of states as tends to be assumed in stage of life cycle

theories[1] (Phelps et al. 2007). Nor do tipping points necessarily manifest as crises that disrupt periods of stability and require radical or revolutionary change as predicted by punctuated equilibrium theories (Besson and Rowe 2012). Rather, organizations' growth over time should be conceptualized as the management of key transition states in coping with continuous and unpredictable change (Phelps et al. 2007).

In order to navigate beyond a tipping point, organizational structures must undergo a transformation, enabling the organization to face new tasks or problems that emerge (Phelps et al. 2007). The selection and use of mechanisms for obtaining the required IT competencies to support the transformation broadly defines firms' *IT governance* (Alaghehband and Rivard 2010). As part of IT governance, top managers are regarded as coaches and champions for transformation (Jansen 2004). Their role is to create and maintain change readiness using a proactive orientation that influences the beliefs, attitudes, intentions and behaviours of the organizational actors that use IT in support of organizational business processes. This transformation can be construed in terms of the acquisition of new knowledge. In short, the firm must have the capability to acquire and apply new and requisite knowledge to resolve the new challenges encountered in a changing environment, which is conceptualized as firms' absorptive capacities (Cohen and Levinthal 1990). Extending the original conceptualization, Zahra and George (2002) distinguish between 'potential' and 'realised' absorptive capacity. 'Potential absorptive capacity' refers to the firm's acquisition and assimilation of external knowledge through exploration for new knowledge. 'Realised absorptive capacity' describes the transformation of existing knowledge by combining new knowledge to implement new operational capabilities. In the context of our study, the salient insight is that firms differ in their capacities to apply new knowledge to *integrate, build, and reconfigure IT resources concurrently with organizational business process and managerial processes in pursuit of performance advantages in a changing or uncertain environment* (i.e., dynamic IT capabilities). Moreover, these differences in firms' capacities can be analysed through the lens of capability maturity models (Phelps

[1] The notion that firms progress through *stages* of a life cycle in a linear, sequential, deterministic or invariant manner overlooks the heterogeneous, path-dependent nature of firm growth (Phelps et al. 2007). Scholars find that such stage of life cycle models have little or no empirical support when tested on large samples (Levie and Hay 1998). Rather, studies find that organizations experience expansion and contraction over time, and so unidirectional linear implications of organismic models are inappropriate (Vyakarnam et al. 2000). Studies also find many exceptions to stage of life cycle sequencing and find instead that many transitional paths are open to organizations (Miller and Friesen 1984). They also find evidence of recurrence, firms moving back down the sequence. Therefore, "firms over lengthy periods often fail to exhibit the common life-cycle progression" (Miller and Friesen 1984, p. 1176).

et al. 2007). These models typically describe a process of moving from low or zero capability through developing capabilities that enable high performance, such as above-average operational efficiency. In the context of transforming patterns of IT use, five states of capability maturity can be synthesized from extant literature as follows (ITGI 2008; Jaklič and Štemberger 2009; Ross et al. 2006; SEI 2006; Valdés et al. 2011).

In state 1, *Initial*, IT-enabled operational responsibilities are ill defined, unstructured and localized in departments rather than the result of collaborative effort across departments (ibid.). Consequently, the firm experiences problems with costs of acquiring, deploying, maintaining and supporting disparate silos of technology, and it faces the challenge of investing in rationalization and standardization of its hardware infrastructure. In state 2, *Repeatable*, IT-enabled operational responsibilities are defined and documented, but traditional localized modes of operating persist in departments. Consequently, the firm experiences problems coordinating business processes that cross multiple groups, and it faces the challenge of justifying high investment costs to replace legacy systems with integrated enterprise systems where the financial payoffs can be delayed for years. In state 3, *Defined*, IT-enabled operational responsibilities are defined that require cooperation between departments. Teams comprised of individuals from multiple departments are established in which individuals with authority are assigned responsibility for the operation and improvement of entire processes end-to-end. Many but not all core processes standardized and integrated across departments. Consequently, the firm experiences costs and delays in configuring IT support for new business configurations (e.g., innovative new services), and it faces the challenge of optimizing sets of IT-enabled business processes (i.e., ERP modules) in order to improve its agility to adapt to innovation opportunities. In state 4, *Managed*, organizational structures are based on end-to-end enterprise processes, and operational performance measures are applied to monitor enterprise processes. All core business processes are standardized and integrated in enterprise system "modules" that can be rapidly reconfigured to support new business configurations (e.g., innovative new services). The challenge the firm faces is to extend business processes and systems to rapidly incorporate business partners' business processes and systems without jeopardizing the integrity of the core business modules. In state 5, *Extended*, core business processes are fully modularized (i.e., in ERP modules), able to rapidly support supply chain integration by plugging in the essential modules. Hence, the basic intuition of a states of capability maturity perspective on organizational growth is that organizations encounter common tipping point challenges over time that result from a misalignment between incumbent operational capabilities (i.e., IT-enabled business processes, management processes) and the demands imposed by the

environment (e.g., for seamless service delivery supported by integrated end-to-end enterprise processes). Navigating beyond these tipping point challenges requires exploiting new knowledge to generate new and improved operational capabilities.

We applied the lens of the foregoing states of capability maturity in order to explicate each construct of dynamic IT capabilities: (1) managerial processes, (2) organizational business processes, and (3) performance outcomes. This process enabled us to qualitatively classify firms based on their dynamic IT capabilities in order to empirically assess which characteristics are common and which are idiosyncratic to firms. In the interest of parsimony, we use the abbreviated term "state" to refer to the states of capability maturity, and we elaborate only the first four states because no site in our study was in state 5 of capability maturity. The results of this process are summarized in Tables 4.1 and 4.2 and the theoretical underpinnings for each attribute are elaborated in the remainder of this section.

Table 4.1. Dimensions of IT governance and their characteristics in States 1-4

Constructs	Characteristics per state of capability maturity				Supporting Studies
Attributes	State 1 Initial	State 2 Repeatable	State 3 Defined	State 4 Managed	
(i) IT GOVERNANCE MECHANISMS					
Envisioning					
Strategic vision The emphasis of the strategic vision defined by council with respect to the role of IT in supporting business processes	Localized processes, low IT integration across departments	Localized processes, IT integrated across departments	Standardized processes, some enterprise systems integration	Global process standardization , highly integrated enterprise systems	Fountain 2001; Hansen et al. 2011; Huang and Tilley 2003; Jaklič and Štemberger 2009; Ke and Wei 2004; Ross et al. 2006; Willcocks et al. 1997
Initiating					
Project Funding Priorities The primary types of applications that receive project funding	Individual applications	Shared, standardized hardware infrastructure	Integrated enterprise applications	Reusable business process components	Capati-Caruso and Valle 2006; Jaklič and Štemberger 2009; Layne and Lee 2001; Mimicopoulos 2004; Ross et al. 2006

Diagnosing					
Process Documentation The extent to which business processes "as-is" well documented and used to inform IT-enabled transformation initiatives	Business processes not formally documented on a consistent basis	Documentation exists for some localized functions	Documentation of standardized enterprise business processes	Quality management goals formalized for business processes	Huang and Tilley 2003; Jaklič and Štemberger 2009; McAdam and Mitchell 1998; Ross et al. 2006
Redesigning					
Process Owners Managers responsible for control, documentation and testing of business processes	Ad hoc	IT department	Functional department managers	Senior managers	Hansen et al. 2011; Jaklič and Štemberger 2009; Ross et al. 2006
Strategic IT-enabled initiatives The primary strategic objective of IT-enabled transformation initiatives	Local/ functional optimization	IT efficiency	Business process efficiency	Responsive to new service demands	Dhillon et al. 2008; Jaklič and Štemberger 2009; Ross et al. 2006; Weerakkody et al. 2008; Willcocks et al. 1997
Reconstructing					
Professionalism in IT management The most salient strategic leadership skill of IT directors (CIOs)	IT-enabled change management	Design and update of standards; funding shared infrastructure	Core enterprise process definition and measurement	Management of reusable business processes	Hansen et al. 2011; Irani et al. 2007; Ross et al. 2006
Evaluating					
Evaluation methods The nature of mechanisms used to justify e-government investments and to evaluate outcomes from the investments?	ROI of local business initiatives	Reduced IT costs	Cost and quality of business operations	Providing customer service when, where and how they want it	Irani et al. 2005; Jaklič and Štemberger 2009; Ross et al. 2006

Performance Monitoring Which stakeholders (executives, functional department directors, IT management, auditors) typically have responsibility for monitoring the performance of IT-enabled transformation initiatives	Predeomina-ntly IT department decision	IT managers, functional department managers responsible	IT managers, functional department managers, executives responsible	IT managers, functional department managers, executives, compliance/ auditors responsible	ITGIOGC 2005; McAdam and Mitchell 1998; Ross et al. 2006; Weill and Ross 2004; Willcocks et al. 1997; Xue et al. 2008
(ii) TECHNOLOGY ENACTMENT					
Process Maturity	Ad-hoc and unstructured processes; processes localized, isolated from other functional departments	Basic processes defined but processes enacted in traditional fashion; no substantial change	Many but not all core processes standardized and integrated across departments	Organization restructured around end-to-end processes; all core processes standardized and integrated	Dhillon et al. 2008; Huang and Tilley 2003; Irani et al. 2007; ITGI 2008; Jaklič and Štemberger 2009; SEI 2006; Valdés et al. 2011

Table 4.2 Distributions of Decision Rights and Accountability (per COBIT)

		Which stakeholders have accountability for each decision?			
Decisions:		Senior Executives	Department Managers	IT Management	Audit/ Compliance
(a) Plan & Organize	Strategy alignment	■	■	■	
	Optimum resource use	■	■	■	■
	Strategy communicated	■	■	■	■
	IT risk		■	■	■
	IT design/acquisition		■	■	
(b) Imple-ment	New projects meet needs		■	■	
	On-time on-budget		■	■	
	IS works properly		■	■	
	Minimize disruption		■	■	
(c) Delivery &Support	IT service meets needs		■	■	
	Optimized IT costs	■	■	■	
	Productive & safe use		■	■	
	Integrity, availability		■	■	■
(d) Mo nito	Monitor IT performance	■	■	■	
	Independent assurance	■			■

Notes: ■ = COBIT best practice

4.1 Theoretical Underpinning: Mechanisms of IT governance (Managerial Processes)

As dynamic IT capabilities mature over time, management develops qualitatively different IT governance capabilities to use strategic vision, requirements definition, solution design and planning, change management, and performance monitoring as mechanisms for promoting IT-enabled business process transformation (ITGI 2008). These mechanisms of IT governance, summarized in Table 4.1, can be defined as: (1) envisioning a new IT-enabled service delivery model, (2) initiating change, (3) diagnosing current business processes, (4) redesigning business processes, (5) reconstructing business processes, and (6) implementing new methods of evaluating performance. Next we examine each attribute in turn.

Envisioning. Envisioning refers to IT governance mechanisms that pertain to establishing a *strategic vision* for IT-enabled business process change that aligns with organizational strategies (Grant et al. 2007; Hansen et al. 2011; ITGI 2008; Jaklič and Štemberger 2009; Ke and Wei 2004). As firms learn to navigate the challenges encountered in each state, the emphasis in the strategic vision of the organization changes qualitatively: e.g., from localized business process to standardized enterprise ("global") processes, and from little integration of IT (a state 1 characteristic) toward highly integrated and modularized enterprise systems (a state 4 characteristic) (Huang and Tilley 2003; ITGI 2008; Ross et al. 2006). In turn, the alignment of IT strategy with the strategic vision for the organization (Dhillon et al. 2008; Gil-Garcia et al. 2007; Hjort-Madsen 2007; Weerakkody et al. 2008) depends in part on which actors have authority for *IT design/acquisition decisions* (Hjort-Madsen 2007).

In the lowest states of capability maturity, authority over IT acquisition decisions are decentralized among functional department managers who direct investments to support their local requirements rather than to integrated enterprise systems (as depicted in Table 4.2 row (a); Hjort-Madsen 2007; Ross et al. 2006; Weill and Ross 2004). In the highest states of capability maturity, executive management authorizes senior IT management to make acquisition decisions regarding enterprise IT architecture and IT infrastructure strategies (Hjort-Madsen 2007). Given the authority, senior IT management can direct funding toward enterprise systems, thereby supporting integrated business processes as a catalyst for IT-enabled transformation initiatives (Preston et al. 2008). As IT and business process redesign increasingly affects a large number of functional areas across the enterprise, more stakeholders (i.e., functional departments, IT department, executives and audit/compliance) are also integrated into IT-related *planning and*

organizing decisions increasingly in the latter states of capability maturity (Hjort-Madsen 2007; ITGIOGC 2005; Jaklič and Štemberger 2009; Tsai et al. 2009).

Initiating. IT-enabled transformation initiatives depend in part on the use of IT governance mechanisms to initiate IT-enabled business process change, which involves identifying and funding IT-use change initiatives (ITGI 2008; Jaklič and Štemberger 2009; Tsai et al. 2009). As firms learn to navigate the challenges encountered in each state, *priorities for project funding* (Capati-Caruso and Valle 2006; Jaklič and Štemberger 2009; Mimicopoulos 2004) shift characteristically from individual departmental application to highly integrated and modular enterprise processes (Heeks and Stanforth 2007; Layne and Lee 2001; Ross et al. 2006).

Diagnosing. The IT governance mechanism of diagnosing current business processes – *documenting as-is processes* – is critical to understanding the changes required to transform incumbent business processes (ITGI 2008; Jaklič and Štemberger 2009; McAdam and Mitchell 1998). Therefore, organizations typically increase their formal documentation of core business processes as they learn to navigate the challenges encountered in each state (Huang and Tilley 2003; Jaklič and Štemberger 2009; Ross et al. 2006).

Redesigning. Business process redesign is an IT governance mechanism for effectuating IT-enabled business process change in government that involves determining process owners and deciding the strategic objectives of change initiatives (Hansen et al. 2011; ITGI 2008; Jaklič and Štemberger 2009). As firms learn to navigate the challenges encountered in each state, the responsibility for *process ownership* is increasingly assigned to a collaborative of senior managers, rather than individuals in departments (Hansen et al. 2011; Jaklič and Štemberger 2009; Ross et al. 2006). The *strategic objectives of IT-enabled transformation initiatives* (Dhillon et al. 2008; Jaklič and Štemberger 2009; Weerakkody et al. 2008) also mature from an emphasis on low-level functionality and cost cutting, to an emphasis on business process efficiency and then responsiveness to new service demands (ITGI 2008; Ross et al. 2006).

Reconstructing. Organizational structures are reconstructed when organizational actors change how they enact technology in support of business processes (Fountain 2001; Gil-Garcia 2006; Luna-Reyes et al. 2007; Tsai et al. 2009). The IT governance mechanisms of change management are thought to be critical for effectuating that change (ITGI 2008; Jaklič and Štemberger 2009; Tsai et al. 2009). Capabilities pertaining to implementing change management mechanisms are distinguished based on managers' IT professionalism and how they engage stakeholders in implementation, delivery and support decisions. *Professionalism*

in IT management is characterized by which skills of IT directors are perceived as most salient to the organization (Hansen et al. 2011; Irani et al. 2007) and shifts characteristically from localized change management skills to management of reusable business processes as firms learn to navigate the challenges encountered in each state (Ross et al. 2006). Likewise, the extent to which executives, functional department directors, IT department managers and auditors are engaged in collaborative decision-making with respect to IT *implementation* and IT *delivery and support decisions* tends to increase with capability maturity (as depicted in Table 4.2 rows (b) and (c); ITGIOGC 2005; Jaklič and Štemberger 2009; Tsai et al. 2009).

Evaluating. Performance evaluation is a necessary governance mechanism in organizations (Grant et al. 2007). Traditional IT-related investment *evaluation methods* emphasize cost-benefit analyses that tend to be cost based (Irani et al. 2007; ITGI 2008). However, much of the momentum for IT-enabled change initiatives projects should come from considering the portfolio of stakeholder benefits, be they quantitative, qualitative or intangible. Poor decision-making often does not consider the wide-ranging portfolio of costs and benefits, which can often lead to significant financial losses. It is only as capabilities in IT governance mature, however, that organizations tend to shift from short-term cost-cutting and return on investment measures to evaluating overall benefit to customers arising from investments in IT-enabled service delivery (Irani et al. 2005; Jaklič and Štemberger 2009). Similarly, *monitoring the performance* of IT-enabled transformation initiatives becomes an increasingly collaborative responsibility shared among senior management as firms learn to navigate the challenges encountered in each state (as depicted in Table 4.2, row (d); Irani et al. 2008; ITGIOGC 2005).

4.2 Theoretical Underpinning: Technology Enactment (Organizational Business Processes)

The foregoing subsection was concerned with the state of capability maturity with respect to *managerial processes* of dynamic IT capabilities (Lim et al. 2011): the IT governance mechanisms by which management induces IT-enabled business process change. How actors' actually use or enact IT can deviate substantially, however, from the ways intended by management (Cresswell et al. 2008; Hjort-Madsen 2007; Orlikowski and Robey 1991). Therefore, this subsection is concerned with the state of capability maturity with respect to *organizational business processes* element of dynamic IT capabilities: how actors *enact technology* in support of organizational business processes (Fountain 2001; Gil-Garcia 2006; Luna-Reyes et al. 2007; Maniatopoulos 2005; Tsai et al. 2009).

Technology enactment can be analysed in terms of *process maturity* characteristics at five states of capability maturity that pertain to firms' recurrent patterns of technology enactment (Huang and Tilley 2003; ITGI 2008; Jaklič and Štemberger 2009; Valdés et al. 2011). Specifically, in state 1, processes as enacted are ad-hoc and unstructured; actors' activities in enacting processes are localized and isolated from other functional departments ("business silos"). In state 2, documentation of basic processes is available but actors continue to enact activities in their traditional fashion; substantial change has not been enacted. In state 3, actors exhibit cooperation between departments, enacting standardized IT-enabled business processes that are integrated across functional departments, but transformation to standardized and integrated business processes is not complete. In state 4, organizational structures are reconstructed around end-to-end business processes, rather than hierarchies, for delivering customer service on demand. Therefore, actors enact standardized IT-enabled business processes that are integrated across functional departments (ibid.; Dhillon et al. 2008; Irani et al. 2007). The key intuition of the process maturity classifications is that organizations can be meaningfully analysed through the lens of their state of technology enactment: the organizational business processes element of dynamic IT capabilities (Lim et al. 2011).

4.3 Theoretical Underpinning: Firm Financial Performance (Performance Outcomes)

In turn, the use of IT governance mechanisms and the enactment of technology have bearing on firms' financial *performance outcomes*. Organizations seek to realize efficiencies by using ERP to reduce or eliminate duplication of efforts between divisions (Davenport et al. 2002). To the extent that ERP integration efforts are successful, organizations should exhibit improved operating efficiencies.

Building on the evolutionary economics, resource based view, and IT business value literature (Lim et al. 2011), we believe that the *performance outcomes* of integrating, building, and reconfiguring IT-enabled resources concurrently with organizational business process and managerial processes form an integral part of dynamic IT capabilities for three reasons. First, a performance element clarifies the systematic nature of dynamic IT capabilities. For example, Zollo and Winter (2002) emphasize that a dynamic capability is a learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness. The systematic pursuit of improved performance stresses the importance of viewing dynamic IT capability as something structured and persistent. It serves to avoid

confusion between dynamic IT capabilities and other causes of variation in organizational business processes and managerial processes, such as ad hoc problem solving and chance. It also distinguishes between variance in operations that results from purposeful managerial interventions versus those that emerge in the absence of managerial intervention or 'drift' (Ciborra et al. 2000). Second, a performance element emphasizes that dynamic IT capabilities necessitate mindful management to align the IT innovation implementation process to environmental contingencies in order to generate superior IT business value (Wolf et al. 2012). Incorporating a performance element recognizes the importance of feedback, in support of mindfulness, regarding the efficacy of attempts to integrate, build, and reconfigure IT resources concurrently with organizational business process and managerial processes. Third, prior definitions of dynamic capabilities explicitly included performance criteria. Some examples are: "the dynamic capabilities approach… endeavors to analyze the sources of wealth creation and capture by firms" (Teece et al. 1997, p. 509) and "sustainable competitive advantage" (Teece 2007, p. 1321) "in pursuit of improved effectiveness" (Zollo and Winter 2002, p. 340), "to fit the environment" (Pavlou and El Sawy 2011, p. 243). For the foregoing reasons we explicitly theorize performance outcomes as an integral and proximate part of dynamic IT capabilities, and not as a distal outcome[2].

4.4 Theoretical Predictions (Hypotheses)

Based on the contributions of the foregoing literature to our theoretical framework (depicted in Figure 4.1), we can advance the following two testable hypotheses related to our research question:

> Hypothesis 1 (H1): Ceteris paribus, firms grouped *within* a state of technology enactment face *common* challenges that they address and resolve through changes in IT governance mechanisms.
>
> Hypothesis 2 (H2): Ceteris paribus, *between* firms grouped into different states of technology enactment, firms' have (a) *idiosyncratic* patterns of IT governance mechanisms and (b) *idiosyncratic* performance in terms of operating efficiency.

Next we subjected our theoretical framework (depicted in Figure 4.1), and its two hypotheses, to empirical examination in the form of ten case studies.

[2] It is noteworthy that to test the effects of dynamic IT capabilities on distal performance outcomes would be tautological (Priem and Butler 2001; Williamson 1999). We address this problem by recognizing performance outcomes as integral and proximate to a theoretical and operational definition of dynamic IT capabilities, which should not be used to test performance outcomes as a distal outcome of dynamic IT capabilities.

5.0 RESEARCH METHOD AND FIELD CONTEXT

5.1 Field Context and Data Collection

The literature acknowledges a popular misconception that dynamic capabilities are the exclusive domain of business administration in for-profit firms (Pärna and von Tunzelmann 2007). The popular misconception reflects a bias in the innovation literature, for example, toward validating theory in for-profit firms. However, evidence from government organizations illustrates the folly of the popular misconception. In response to a range of changing economic, political and ideological demands, the structures and processes of public service delivery are changing and modernising (Bekkers 2007; Foley and Alfonso 2009; Pärna and von Tunzelmann 2007). For example, local government organizations need to develop creative ways to address fiscal restraints while fulfilling citizen demands for efficient, anywhere, anytime, online service delivery. As we will show, some government organizations exhibit better dynamic IT capabilities than others to effectuate such change. In view of these developments, the need for dynamic capabilities to change operational capabilities is a reality in government, yet there is a paucity of guidance available from the literature to date (ibid.). In light of the need for more guidance, we assessed our theoretical framework in the context of local governments in Ontario, Canada.

Local governments in Canada are *corporations* responsible for the administration of local public service delivery (MMHA 2010). These corporate entities have a hierarchical structure with elected officials comprising the board and with directors holding senior management roles. The senior-most managing director is typically called the Chief Administrative Officer (CAO). The Chief Information Officer (CIO) is typically called an "IT director". As depicted in Table 4.2, the CIO is the one executive that has decision rights, responsibility and day to day involvement with every dimension of IT governance in support of (1) corporate business strategy and (2) the operational strategies of all business subunits, as per the practitioner (e.g., ITGI 2008; ITGIOGC 2005) and academic literatures (e.g., Chen et al. 2010; Ross et al. 2006). Consequently, the focus of our field research was on CIOs' expert understandings of IT governance in the context of their own organizations.

Governments have made considerable investments in IT hardware and software in an effort to transform public service delivery and increase operational efficiencies. Nonetheless, such change has been difficult to implement as evidenced by a recent report exposing significant variance in operating efficiencies among Ontario local governments (MMHA 2010). Consequently, local governments in

Ontario provide a relevant context in which to examine potential differences in organizations' dynamic IT capabilities. In addition, IT governance became a legally mandated component of corporate governance with the 2008 passage of "National Instrument 52–109", the Canadian version of the Sarbanes-Oxley Act (Bart and Turel 2010). Thus, local governments in Canada provide a potentially rich context in which to study IT governance.

Data were collected from CIOs of local governments by means of interpretive case study method because our interest is in the contemporary events, interpretations and up-close examination of organization-level factors (Benbasat et al. 1987; Yin 2003): specifically, the reconfiguration of IT concurrently with *managerial processes, organizational business processes* and the links to *operating efficiencies* that comprise dynamic IT capabilities. As Eisenhardt (1989b) notes, case studies can be useful to develop and extend emergent theories, such as the theoretical framework depicted in Figure 4.1. Following Huang et al. (2010), prior to case study in the field we identified attributes of the constructs for which we gathered qualitative data, as depicted in Figure 4.1. *A priori* specification of constructs helps shape design and analysis in qualitative research, permits data to be collected and analysed in a consistent fashion (Eisenhardt 1989b), and substantiates the theoretical validity of qualitative study (Huberman and Miles 2002).

We gathered data with which to assess our theoretical framework and its predictions (i.e., Hypotheses H1 and H2) primarily through face-to-face interviews based on a semi-structured questionnaire (based on Table 4.1). To that end, we initially recruited CIOs from five local governments that were identified by expert informants (at the relevant industry association, MISA) as having similar enterprise systems but substantial variance in technology enactment. Recruitment involved calling CIOs in each local government to explain the objective of the study and ask them to participate in face-to-face interviews. In return, they were promised a copy of the final report. We subsequently recruited and interviewed CIOs at additional local governments (also identified by expert informants at MISA) using the same semi-structured questions in order to enable cross-case comparisons (Miles and Huberman 1984). The recruitment and interview process concluded once interviewee responses exhibited redundancy, at which point "efforts to get additional members cannot be justified in terms of the additional outlay of energy and resources" (Guba and Lincoln 1989, p. 233). In total, CIOs at ten local governments were recruited and all ten agreed to participate. Interviews of approximately 120 minutes duration were recorded with the consent of the interviewees and produced 19 hours of transcripts, which we used to code our qualitative observations. Data were also obtained from archival

records such as official annual financial reports and strategic IT plans, where applicable.

5.2 Control Variables

In an effort to isolate the idiosyncratic versus common elements of IT governance mechanisms, technology enactment and operational efficiencies (i.e., to satisfy the "ceteris paribus" condition of the hypotheses), we took precautions to control for external environment influences. To that end, we enlisted the assistance of expert industry informants at MISA to select interview sites that would maximize similarities with respect to institutional/industry influences but maximize variation and allow comparisons with respect to constructs of interest (Guba and Lincoln 1989). Variation pertained to states of capability maturity. Similarities pertained to the (1) regulative, (2) normative and (3) cultural-cognitive ("mimetic") institutional/industry environment as elaborated next.

First, the pressure on government organizations to transform can be a consequence of political/legal (*regulatory*) pressure from higher-tier government (Jaklič and Štemberger 2009; Ongaro 2004). Such coercive regulatory pressures are thought to extrinsically motivate managers to simply meet minimal accepted short-term metrics rather than implement new practices that improve service delivery for the long term (Osterloh and Frey 2000). Second, society places *normative* pressures on governments regarding the public services that societal members value and expect of their governments (e.g., Currie and Guah 2007; Fountain 2001; Gil-Garcia 2006; Hjort-Madsen 2007). In consequence, "the kind of information needs and citizen services required in different cities do not differ significantly in most cases" (Kumar and Sareen 2011, p. 144). Third, the competitive pressure of different industries drives IT use for increased efficiency while lowering the ability of any one organization to gain a sustainable advantage over other organizations because organizations can imitate (i.e., mimic) the same IT choices (Melville et al. 2004). In particular, institutional theory tells us that organizations tend to adopt *mimetic behaviours* in which they imitate the decisions of other organizations they perceive to be successful (Liang et al. 2007; Mignerat and Rivard 2009) such as acquiring similar IT (Gosain 2004). Therefore, exogenous regulative, normative and mimetic influences have the potential to introduce artefacts into the results we observe in our case studies. In order to mitigate these artefacts, we used natural controls for exogenous variables by selecting all cases (1) from the same country/province in order to control for regulative influences, (2) from local governments that deliver the same twelve types of public services to citizens (MMHA 2010) in order to control for normative expectations, and (3) from local governments that had acquired ERP software, in order to control for mimetic influences.

In sum, our research controlled for (i.e., regulative policies, normative standards, available technology) or measured (i.e., population, employees, revenues, spending, governance structures, IT architecture and implementation) all of the contextual factors synthesized from the extant literature examining enterprise IT management and enactment in government organizations (i.e., Janssen and Hjort-Madsen 2007).

5.3 Reliability and Validity

Three researchers independently coded qualitative data gathered from interviews in order to enhance confidence in the findings (Eisenhardt 1989b). In order to mitigate bias, one coder had attended all face-to-face interviews, the second had attended the initial set of five interviews, and the third relied on transcripts from interviews. All coders applied the coding matrices and coding protocol elaborated in Appendix A to classify subjects' qualitative responses to our semi-structured questions (which also appear in Appendix A). We then tested inter-rater reliability, which demonstrated good agreement at 90.38% (ibid.) and Kappa of 0.864, which represents "almost perfect" strength of agreement (Landis and Koch 1977, p. 165). Disagreements were resolved by discussion, and we proceeded only when we obtained unanimous agreement with respect to the coding.

Dual sources of evidence were used in support of internal validity: face-to-face interviews and documentation (Dubé and Paré 2003). Face-to-face interviews based on a semi-structured questionnaire enabled us to obtain detailed insight about specific issues within the context of each firm. Documentation such as financial reports provided a second source of (relatively "objective", cf. Tallon and Kraemer 2007) evidence regarding the impacts of IT in each firm. In order to enhance the interpretive and evaluative validity of our interpretations of the data, we sent a copy of our report to interviewees for a review, at which time participants had the opportunity to make changes to our interpretations (Huberman and Miles 2002). We are confident that our observations and interpretations correctly represent the state of capability maturity in each site because the participants identified no further changes.

6.0 ANALYSIS

6.1 Case Backgrounds

In the interest of anonymity and parsimony, we use the pseudonyms Alpha, Beta, Gamma, etc. to refer to each of the ten sites (cases) examined in our study, following Orlikowski (1996). Descriptive data for each site is briefly described next.

Alpha and Epsilon had acquired ERP software but accomplished nil transformation to an IT-enabled business model. Gamma acquired the same ERP software as Alpha ten years prior to our study and struggled for seven years with standardizing and integrating enterprise business processes. In the last three years before our study a new IT director oversaw a transformation from non-integrated departmental legacy systems to integrated ERP. Beta had outsourced its ERP installation by hosting on the established ERP at Delta. Nonetheless, Beta was reacting to functional department demands to support non-standard localized business processes. Delta had implemented ERP so extensively that nearly all core business processes were standardized and integrated using ERP at the time of our study. Both Theta and Zeta had acquired ERP software, and IT directors had the respect of senior management at both sites. Zeta, for example, had won awards for its IT-enabled call centre capabilities. Nonetheless, both sites were still having difficulty getting departments to take ownership of the responsibility to use the ERP system, rather than workarounds, in support of their core business processes. In contrast to Theta and Zeta, ERP at Kappa was used for financial and HR management, but disparate silos of automation still managed business processes in other areas of the organization. Nonetheless, Kappa had achieved the standardized shared IT infrastructure that Lambda had not. Lambda had a steering committee, but lacked progress on a standardized IT infrastructure. Finally, Iota had transformed from silos of automation two years before our study, to a shared IT infrastructure and then to implementing enterprise-wide business processes in ERP at the time of our study, following a series of strategic change initiatives. As we delved deeper behind the story for each site, distinct patterns began to emerge with respect to our endogenous constructs, despite the similar external environments of all ten sites. The (1) regulative, (2) normative and (3) cultural-cognitive ("mimetic") institutional/industry environment for each site is presented in Table 6.1.

Table 6.1. Comparison of exogenous (environmental) influences for all ten cases

Site (Case):	Exogenous (environmental) Influences		
	Regulative: Country/Province	**Normative:** Public services delivered	**Mimetic:** Information Technology acquired
Alpha	Canada/Ontario	Local government services	Integrated enterprise information systems ("ERP")
Beta	Canada/Ontario	Local government services	Integrated enterprise information systems ("ERP")
Gamma	Canada/Ontario	Local government services	Integrated enterprise information systems ("ERP")
Delta	Canada/Ontario	Local government services	Integrated enterprise information systems ("ERP")
Epsilon	Canada/Ontario	Local government services	Integrated enterprise information systems ("ERP")
Zeta	Canada/Ontario	Local government services	Integrated enterprise information systems ("ERP")
Theta	Canada/Ontario	Local government services	Integrated enterprise information systems ("ERP")
Iota	Canada/Ontario	Local government services	Integrated enterprise information systems ("ERP")
Lambda	Canada/Ontario	Local government services	Integrated enterprise information systems ("ERP")

6.2 Comparative Analysis: Technology Enactment (Organizational Business Processes)

We asked each IT director to what degree his or her organization's *intended business model* required highly standardized and highly integrated business processes enterprise-wide. All ten IT directors indicated that their respective organizations require both highly standardized and highly integrated business processes, which is characteristic of an organization that has fully completed state 3 of capability maturity. In order to assess each site's state of capability maturity with respect to technology enactment we asked each IT director to characterize how actors use IT today to enact business processes. IT directors at both Alpha and Lambda, which have acquired ERP software, characterized technology enactment as having low standardization and low integration (i.e., state 1 technology enactment). Department managers still view their customers as unique, even though customers receive services from many functional departments. Actors operate independently with little cooperation across

departments, and work around the ERP system by using legacy systems and business processes. In the words of the IT director at Lambda,

> "A lot of departments identify IT and need for IT in new initiatives, but the concern is they don't understand the need for standardization from a corporate perspective."

Despite having acquired ERP, heterogeneous business applications remain in departmental silos, as relayed by Alpha,

> "You will go to public works and see tool X that does work order management. You can go over to transit and see tool Y that does work order management. You will go over to fleet and see the same tool X but a different version that does work order management. You go over to facilities you'll see another tool that does work order management."

Beta, Zeta, Kappa and Theta each has the same problem with heterogeneous business applications in silos, but they have implemented a standardized IT hardware infrastructure with a low degree of integration between operational applications (i.e., state 2 technology enactment). As characterized by the IT director at Beta,

> "We integrate where required and where it's done it's fairly automated… but we do have a low degree of integration or interfaces between [operational] applications."

In contrast, the IT directors at Gamma and Iota characterized many enacted processes as standardized and involving cooperation across departments, using integrated enterprise systems (ERP) (i.e., state 3 technology enactment). Departments now act with less autonomy, but continue to enact some business processes in their traditional ways because they have some ERP modules still "sitting on the shelf" (IT director, Gamma) and some core business processes that were not using the ERP system. Actors in all departments at Delta use the ERP system to enact highly standardized and highly integrated business processes across departments. Delta is attempting to navigate through state 4 technology enactment (i.e., modularized business process sets), but is impeded by a few core operations that still rely on legacy systems.

The foregoing results show substantial variation in the states of *technology enactment* across firms, even though the ten sites have similar IT resources and institutional/industry contexts. We then began to find characteristic patterns in IT governance mechanisms implemented at each of the ten the sites: commonalities

between organizations *within* each state of technology enactment, and characteristic idiosyncrasies *between* organizations in different states of technology enactment, as elaborated next.

6.3 Comparative Analysis: Mechanisms of IT Governance (Managerial Processes)

We coded qualitative data gathered from interviews with CIOs according to the qualitative distinctions for IT governance mechanisms that appear in Tables 4.1 and 4.2 (and detailed in Appendix A) in order to facilitate within-state and between-state comparisons. The results of coding appear in Tables 6.2 through 6.7. The tables depict characteristic patterns in IT governance mechanisms implemented at each of the ten sites. *Within* the group of firms at each state of technology enactment we found common challenges that firms attempted to address and resolve through changes in IT governance mechanisms, in support of Hypothesis 1. *Between* the groups of firms at each state of technology enactment we found *idiosyncratic* patterns of IT governance mechanisms in support of Hypothesis 2a, and *idiosyncratic* performance (in terms of operating efficiency) in support of Hypothesis 2b. In the interest of parsimony, we report only exemplary qualitative responses from all of the responses that led to our conclusions as follows.

Table 6.2 State 1 cases: Within-state comparison of IT governance mechanisms

Constructs:	*State characteristics of IT governance mechanisms in use*			
Attributes	1. Initial	2. Repeatable	3. Defined	4. Managed
Envisioning:				
Strategic vision	A E L			
Initiating:				
Project Funding Priorities	A E L			
Diagnosing:				
Process Documentation	A E L			
Redesigning:				
Process Owners	A E L			
Strategic ICT-enabled change initiatives	A E L			
Reconstructing:				
Professionalism in IT management	E L	A		
Evaluating:				
Evaluation methods	A E L			
Performance Monitoring	A E L			

Notes: = Recommended to navigate beyond state 1, A = Site Alpha E = Site Epsilon L = Site Lambda

Table 6.3 State 1 cases: Within-state comparison of decision rights and accountability

		Which stakeholders have accountability for each decision?			
Decisions:		Senior Executives	Department Managers	IT Management	Audit/ Compliance
(a) Plan & Organize	Strategy alignment			A E L	
	Optimum resource use			A E L	
	Strategy communicated			A E L	
	IT risk	L		A E L	
	IT design/acquisition		A E L		A
(b) Imple-ment	New projects meet needs	L	A	E L	
	On-time on-budget			A E L	
	IS works properly			A E L	
	Minimize disruption			A E L	
(c) Delivery &Support	IT service meets needs		A L	L	
	Optimized IT costs			A E L	
	Productive & safe use		A E	A L	
	Integrity, availability		E	A E L	A
(d) Mo nito	Monitor IT performance			A	
	Independent assurance		A	A	E L

Notes: ▭ = COBIT best practice, A = Site Alpha E = Site Epsilon L = Site Lambda

Table 6.4 State 2 cases: Within-state comparison of IT governance mechanisms

Constructs:	*State characteristics of IT governance mechanisms in use*			
Attributes	1. Initial	2. Repeatable	3. Defined	4. Managed
Envisioning:				
Strategic vision	Z T	B K		
Initiating:				
Project Funding Priorities		K T	Z B	
Diagnosing:				
Process Documentation		Z B K T		
Redesigning:				
Process Owners		B Z T	K	
Strategic ICT-enabled change initiatives		B T	Z K	
Reconstructing:				
Professionalism in IT management		Z B K T		
Evaluating:				
Evaluation methods		B K	Z T	
Performance Monitoring	Z	B K	T	

Notes: ▭ = Recommended to navigate beyond state 2, Z = Site Zeta B = Site Beta K = Site Kappa T = Site Theta

Table 6.5 State 2 cases: Within-state comparison of decision rights and accountability

		Which stakeholders have accountability for each decision?			
Decisions:		Senior Executives	Department Managers	IT Management	Audit/ Compliance
(a) Plan & Organize	Strategy alignment	Z T		Z B T K	
	Optimum resource use		T K	Z B T	T
	Strategy communicated	T		Z B T K	
	IT risk			Z B T K	Z
	IT design/acquisition	T	K	Z B T	
(b) Imple-ment	New projects meet needs	T	B K	Z B T	
	On-time on-budget	T	B T K	Z B T	
	IS works properly		K	Z B T K	
	Minimize disruption		K	Z B T K	
(c) Delivery &Support	IT service meets needs			Z B T K	
	Optimized IT costs	T		Z B T K	
	Productive & safe use		Z T K	Z B T	
	Integrity, availability		T K	Z B T K	
(d) Mo nito	Monitor IT performance	T	K	Z B T K	
	Independent assurance			Z B K	Z T

Notes: = COBIT best practice, Z = Site Zeta B = Site Beta T = Site Theta K = Site Kappa

Table 6.6 State 3 cases: Within-state comparison of IT governance mechanisms

Constructs:	*State characteristics of IT governance mechanisms in use*			
Attributes	1. Initial	2. Repeatable	3. Defined	4. Managed
Envisioning:				
Strategic vision			I	G D
Initiating:				
Project Funding Priorities			I G D	
Diagnosing:				
Process Documentation			I G D	
Redesigning:				
Process Owners			I G D	
Strategic ICT-enabled change initiatives		I D	G	
Reconstructing:				
Professionalism in IT management		I	G	D
Evaluating:				
Evaluation methods		I	G D	
Performance Monitoring		G D	I	

Notes: = Recommended to navigate beyond state 3, I = Site Iota G = Site Gamma D = Site Delta

Table 6.7 State 3 cases: Within-state comparison of decision rights and accountability

			Which stakeholders have accountability for each decision?			
		Decisions:	Senior Executives	Department Managers	IT Management	Audit/ Compliance
(a)	Plan & Organize	Strategy alignment	G	G	G D	I G
		Optimum resource use	D		I	G
		Strategy communicated	G		G D	
		IT risk	I	I	I G D	G D
		IT design/acquisition		G D	I G D	
(b)	Imple-ment	New projects meet needs		I G D	I G D	D
		On-time on-budget	I		I G D	G
		IS works properly		D	I G D	I G
		Minimize disruption		G D	I G D	
(c)	Delivery &Support	IT service meets needs		G D	I G D	
		Optimized IT costs			I G D	
		Productive & safe use	G	I G	I G D	G
		Integrity, availability		G	I G D	I G
(d)	Mo nito	Monitor IT performance	I G	I	I D	G
		Independent assurance			D	G D

Notes: = COBIT best practice, G = Site Gamma D = Site Delta I = Site Iota

Envisioning. Characterizations of *strategic vision* were elicited in face-to-face interviews. The IT directors for the three sites exhibiting state 1 technology enactment (Alpha, Epsilon, Lambda) described the IT component of their organizations' overall strategic plan as "non-existent" or "in development", and left to individual departments (a state 1 characteristic, Table 6.2). Two of the four sites at state 2 of technology enactment relayed the same problem (Zeta, Theta), whereas the other two sites (Beta, Kappa) referred to a vision for integrated IT infrastructure (hardware) in the organizational strategic plan (a state 2 mechanism, Table 6.4). In contrast, Iota described a strong vision for standardized enterprise-wide processes (a state 3 mechanism, Table 6.4) and Gamma, Delta described a strong vision for highly integrated global business processes and enterprise systems (a state 4 mechanism, Table 6.6).

We next assessed the extent to which the authority to make *acquisition decisions* related to IT architecture and infrastructure strategies was centralized in the IT department, or decentralized in functional departments. The pattern of decentralized decision-making regarding IT choice/design and acquisition is depicted in Table 6.3, Table 6.5 and Table 6.7 for organizations in states 1, 2 and 3 respectively. Functional departments have dominant control over new IT systems design and acquisition at Lambda and at Alpha, which stated,

> "Typically what we've done here is the departments have designed or bought it [their own system] and then they don't want to sustain it so they

> come over [to the IT department] and say 'you sustain it' and we say 'okay, no problem'."

The pattern that emerged in Table 6.3 shows that, whereas the department managers select the technology for their individual departments, the IT department is nonetheless held solely responsible for implementing that IT on time, on budget and with minimal disruption, and for maintaining and supporting it. In contrast, the acquisition process is a markedly collaborative effort between IT, department managers and executives in organizations that have successfully navigated multiple states of technology enactment as depicted in Table 6.5 and Table 6.7. The IT director at Gamma articulated that IT department control of funding for IT architecture and infrastructure depends on the strength of strategic vision from council:

> "We have a centralized control, decentralized delivery model… We actually took an [IT governance] proposal to council, and council created what is called a 'technology framework' where council authorized the IT department to be the custodian and the guardian of IT… [Now] our budget, the entire $25 million, is actually in turn reallocated to the departments… They [departments] have to come to us for standards…and any position that is created, if it has any technology dimension in the job description, is first sent to me for approval… The reason you have to bring them all together is that if you don't do that you will not have the same systems, you will not have the same procedures, you will not have the same methods… I tried this in [Alpha] but they balked. The department heads didn't want it. They want their own kingdoms. But here it's working."

Initiating. In describing the degree to which senior management *communicates responsibilities* for all personnel in the enterprise to exploit IT in improving operations, the responsibility falls solely on IT in Sites Alpha and Lambda (Table 6.3). However, because department managers and not IT control IT acquisition decisions, the IT directors in the two sites had no authority to enforce standardized selection in the interest of the enterprise overall (a state 1 characteristic). Consequently, investments in IT infrastructure at Lambda, for example, competed for funding:

> "We look for new opportunities, for money for infrastructure. But [councillors, commissioners] provide their top 1-3 priorities for infrastructure, so the CAO has to decide to allocate funding for IT or [civic] infrastructure: sidewalks, sewer, water, tourism upgrades, cultural centre and recreation facilities. We end up having to transfer monies from

> another department to get an IT staff member so taxes don't increase. So we would get $100,000 to do a portal for social services, or economic development, or tourism. We would jump on a federal government grant for $500,000 to extend wireless Internet to rural taxpayers, etc."

The trade-offs that arose from competitive funding for IT resulted in heterogeneous piecemeal infrastructure investments over time. In contrast, senior executives, who *do* have authority over functional departments, exercised a high degree of communication to functional departments regarding their responsibilities to support enterprise strategy for IT at Theta and Gamma, which have successfully navigated state 2 and state 3 of technology enactment respectively. Substantial differences were also observed in discussions of *project funding priorities*. At Alpha and Lambda, IT directors described a priority for funding projects that optimize local departmental functionality (a state 1 characteristic) stating, "all of the departments initiate their own project". In contrast, project funding is directed to developing the shared IT infrastructure at Kappa and Theta (a state 2 mechanism), and to investments in enterprise systems (ERP) at Zeta, Beta (recommended for organizations in state 2 or 3) and Iota, Gamma and Delta (completing state 3).

Diagnosing. We inquired as to the degree to which business processes are documented at each site. Alpha and Lambda indicated that they had very few *documented business processes* (a state 1 characteristic). Beta, Zeta, Kappa and Theta indicated that some departments had documented some of their localized business processes (a state 2 characteristic). Documenting business processes was noted as a key factor in Zeta's success in resolving the tipping point in state 2:

> "Different departments, such as land development, are required to document relevant processes as part of the application life cycle. We were able to complete the transition [to a common infrastructure] because the requirement helped to give IT control to represent the enterprise interests first."

Gamma, Iota and Delta indicated that standardized enterprise business processes are documented to a high extent in their ERP systems (a state 3 mechanism) and indicated that documentation was an instrumental mechanism in helping to implement ERP in each of the affected departments. Iota capitalized on changes in external regulations as an opportunity to standardize business processes around best practices embedded in the ERP system as follows:

> "When new regulations come out, such as new accounting or cash handling regulations, we [IT department] use the need for compliance to force change."

Redesigning. When asked to what degree senior managers or functional department managers were *process owners*, accountable for control, documentation and testing of business processes, rather than the IT department, Alpha, Lambda and Epsilon described an environment where functional managers attempt to optimize their department's internal operations and consequently there is an ad hoc rather than an organized enterprise approach to process control, documentation and testing (a state 1 characteristic). This problem is due to lack of authority vested in IT, as exemplified at Epsilon:

> "[Process ownership] has got to be driven by the business unit. But, while we bought an enterprise system and employees at our long-term care facility for instance are supposed to be using it, I don't think they are using it efficiently. We can't really go in and dictate or force them to use it. We can only go in and ask 'do you need help'."

Beta and Theta (at state 2 of technology enactment) rely on the IT department (a state 2 mechanism). Whereas vesting the IT department with centralized control was instrumental in bringing about a standardized IT infrastructure, as previously noted by Zeta, when attempting to implement state 3 standardized enterprise business processes:

> "We need 100% involvement on the business side [but] so far they seem content to let us [IT] lead; to abdicate decision making to us."

The lack of process ownership by department managers was directly impeding implementation of state 3 standardized enterprise business processes. Further supporting this contention, we found that Iota, Gamma and Delta, each of which have successfully navigated state 3, all allocated accountability to department managers (a state 3 mechanism). We also found that executives do not share in ownership of processes at any of our sites. The IT directors also described the focal object of *strategic IT-enabled transformation initiatives* at their respective organizations. Because functional departments drive application decisions in Alpha and Lambda, their strategic focus is local functional optimization (a state 1 characteristic). Beta and Theta (at state 2 technology enactment) and Iota (at state 3 technology enactment) are focused on "ensuring that we are using IT in the most effective way within the departments so that they can deliver…efficiency" (IT director, Beta), while improving business operations is a future objective. This strategy is appropriate (a state 2 mechanism) for the organizations at state 2,

which can emphasize the cost benefits of standardized infrastructure in support of achieving a shared IT infrastructure. For example, Kappa stated,

> "To get support for standard infrastructure we show them what information they don't get today, and the cost of building technical bridges between systems to get that information."

The focus on IT cost reduction rather than business process efficiency is, however, impeding progress for organizations implementing standardized enterprise business processes via ERP (i.e., navigating state 2 and facing state 3 implementation challenges). Support for our contention is evident in the finding that Gamma, which is active in the transformation process of implementing enterprise-wide ERP implementation, reports a strategic focus on efficiency in business processes (a state 3 mechanism). Zeta and Kappa have also adopted this strategic focus in support of navigating state 3 challenges: enterprise-wide ERP implementation. Delta, which has already implemented enterprise-wide ERP (a state 3 characteristic), also has an IT-efficiency focus (a state 2 mechanism). The literature suggests that it is not IT efficiency but responsiveness to new service demands that should become the strategic focus (a state 4 mechanism) if the organization intends to navigate state 4, which involves building an enhanced capacity to innovate products/services through full modularization of business process sets in enterprise IT. However, we observed no evidence of a desire to innovate products/services at Delta, which concurs with their lack of focus on "responsiveness to new service demands".

Reconstructing. Further differences emerged when we inquired about *professionalism in IT management:* what is considered the most salient management skill of an IT director at each site. The IT director at site Lambda considers the most salient skill to be helping departments to support their local initiatives with best of breed IT, which has led to the proliferation of silos of business automation. IT directors at Alpha and Beta consider their most salient skill to be defining standards for infrastructure and attempting to steer IT-related funding to standardized infrastructure (a state 2 mechanism). This focus has helped Beta to move to a standardized infrastructure, but Alpha has not made the same change. The overwhelming use of other state 1 IT governance mechanisms at Alpha provides a compelling explanation for the lack of progress (Table 6.2). All of the sites at state 2 of technology enactment (Zeta, Beta, Kappa, Theta) also place a premium on defining and funding standards, which supports the significance of this mechanism for organizations at state 2, but is impeding these organizations from progressing to state 3 (Table 6.4). Organizations at state 3 of technology enactment have varied views on the most salient skill of an IT

director. Iota suggests it is championing shared infrastructure. This emphasis seemed to reflect the IT director's pride in past successes:

> "When I started we had silo systems [infrastructure] and constant breakdowns. I helped to engineer the purchase of a local Internet service provider, which led to a common infrastructure."

However, Iota had progressed to implementing enterprise-wide ERP. At this state, the literature suggests that the most salient skill for an IT director is defining and measuring core enterprise business processes (Irani et al., 2007; Ross et al., 2006). Gamma expressly supported this contention. In preparation for navigating state 4, Delta is developing state 4 skills: management of reusable business processes embedded in ERP modules. As depicted in Table 6.7, the sites that more actively engaged executives, auditors/controllers or department managers, not just IT managers, in IT *delivery and support decisions* were the same sites that exhibited the greatest progress in technology enactment: e.g., Gamma, Delta and Iota. In contrast, delivery and support decisions fall primarily to the IT department alone at the sites with least progress in technology enactment: Alpha and Lambda (Table 6.3).

Evaluating. The IT directors at Alpha and Lambda characterized the organization's *evaluation methods* as focused on short-term ROI (a state 1 characteristic), whereas the IT director for Beta, Kappa and Iota emphasized IT cost reductions (a state 2 characteristic). This evaluation method is appropriate for organizations at or entering state 2 of technology enactment but is impeding progress at Iota, which is in state 3 implementing standardized enterprise business processes in ERP. According to the literature (Irani et al., 2005: Jaklič and Štemberger, 2009; Ross et al., 2006) Iota, should emphasize evaluation metrics based on cost and quality of business *operations*. The finding that Gamma and Delta (both at state 3 technology enactment) have adopted the latter evaluation metrics supports the foregoing contention. As recorded at Delta,

> "In general the business drivers for business objectives are levels of service and bringing on new services. There isn't a real focus from the business departments on ways to reduce IT costs… I think we're here - probably in the middle of the third state… [Our evaluation process has] dimensions like customer service, like risk, and ROI is just one of them. I think the other is breadth of impact."

Zeta and Theta have also adopted the state 3 evaluation methods in preparation for navigating state 3. We next asked IT directors to describe how they delegate responsibility for *monitoring the performance* of IT-enabled transformation

initiatives. As depicted in Table 6.3, responsibility for monitoring lies predominantly with the IT department at Alpha, Lambda and Zeta, which the literature suggests would impede their capability to successfully navigate the challenges of state 2 of capability maturity (ITGIOGC 2005; McAdam and Mitchell 1998; Ross et al. 2006; Weill and Ross 2004; Willcocks et al. 1997; Xue et al. 2008). Performance monitoring is the responsibility of IT and functional managers but not executives and auditors at Beta, Kappa, Gamma and Delta, which also impedes their capability to successfully navigate state 3 of capability maturity. Performance monitoring is the responsibility of IT managers, functional managers and executives but not auditors at Theta and Iota, which impedes their capability to successfully navigate state 4 of capability maturity.

The foregoing findings suggest that organizations have implemented characteristically different IT governance mechanisms and technology enactment, which is evident based on the organizations' states in capability maturity. The significance of these differences became evident when we examine differences in business (service delivery) outcomes as follows.

6.4 Comparative Analysis: Firm Financial Performance (Performance Outcomes)

Whereas public sector organizations are expected to acquire IT in an effort to increase their operational efficiencies (e.g., Brown and Thompson 2011; Devadoss et al. 2002; Dwivedi et al. 2011; Irani et al. 2007), large discrepancies are evident in operational efficiencies as reported by local governments in Ontario (MMHA 2010). Therefore, it is instructive to compare operational efficiencies for our ten sites. To that end we drew on audited annual reports to compute three efficiency metrics: (1) the number of employees (i.e., "staffing" or manual labour) required to deliver local government services per citizen (United Nations 2012), (2) per-capita operating costs and (3) total revenues from tax (MMHA 2010) The results, depicted in Figure 6.1, show a trend from the highest manual labour requirement (series A) and the highest annual expenditures per citizen (series B) for local governments in state 1 of technology enactment to the lowest manual labour requirement and the lowest annual expenditures per citizen for municipalities in state 3 of technology enactment. As expected, higher operating costs translate into higher tax burden (series C) to sustain public service delivery. Moreover, ANOVA results confirmed that the trends illustrated in Figure 6.1 for (A) manual labour requirements ($F=11.914$, $p<0.010$), (B) annual operating costs ($F=12.754$, $p<0.010$), and (C) tax burden on citizens ($F=15.150$, $p<0.005$) are indeed significant.

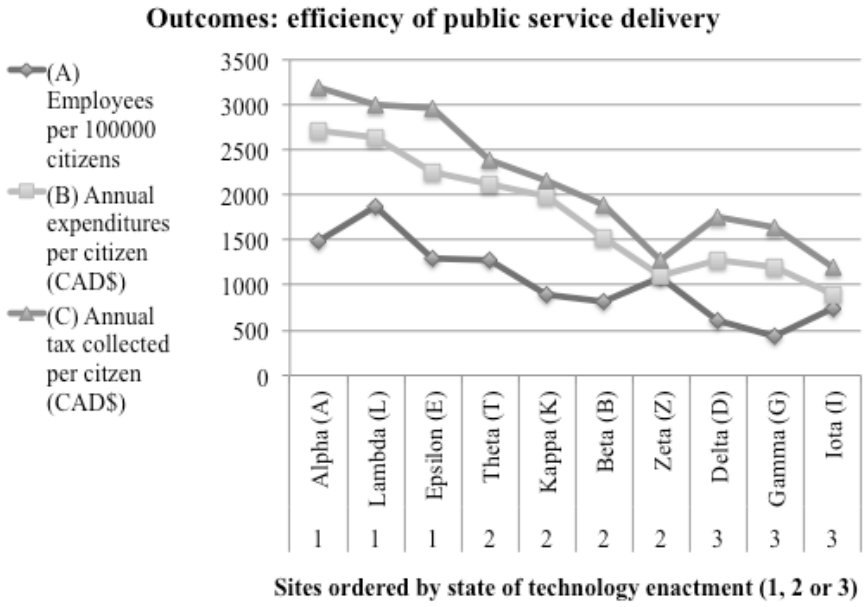

Figure 6.1 Within-state and between case comparison of firm performance outcomes

7.0 DISCUSSION AND IMPLICATIONS

7.1 Major Findings

Conflicting views in the extant literature that cast dynamic capabilities as idiosyncratic on one hand versus having common elements shared across firms on the other hand (Barreto 2010) have resulted in criticisms of dynamic capabilities theory as a black box that is invisible, difficult to observe, or causally ambiguous (Pavlou and El Sawy 2011). The conflicting views obfuscate the definition, empirical grounding and measurement of dynamic capabilities. Our study contributes conceptual clarity by identifying sets of variables that can classify firms into states of technology enactment, which shows important common characteristics within groups and important differences between groups in an empirical setting (Phelps et al. 2007). The important characteristics that our theoretical framework was able to identify pertain to *which elements of firms' dynamic IT capabilities are common and which elements are idiosyncratic in explaining variations in IT contributions to firm performance*, which was our research question. Specifically, the empirical evidence for our theoretical framework shows that firms face *common* tipping point challenges specific to each state of technology enactment. Firms address and resolve these challenges through changes in IT governance mechanisms, as predicted in Hypothesis 1. We also find evidence that firms at different states of technology enactment (i.e., tipping point challenges) have (a) *idiosyncratic* patterns of IT governance mechanisms and (b) *idiosyncratic* performance in terms of operating efficiency, as predicted in Hypothesis 2.

By advancing and empirically validating a 'states of capability maturity' perspective, we seek to contribute conceptual coherence to the discourse on dynamic IT capabilities. Specifically, diverging views in the extant literature that cast dynamic capabilities as idiosyncratic on one hand versus having common elements shared across firms on the other hand (Barreto 2010) have resulted in criticisms of dynamic capabilities theory as a black box that is invisible, difficult to observe, or causally ambiguous (Pavlou and El Sawy 2011). The divergent conceptualizations therefore obfuscate the definition, empirical grounding and measurement of dynamic capabilities. Our study offers conceptual clarity integrating both views by empirically identifying elements of dynamic IT capabilities that firms have in common – such as common tipping point challenges arising from constraints in five states of technology enactment – and elements that are idiosyncratic between firms in different states of capability maturity – such as specific patterns of IT governance mechanisms implemented in

firms and significantly different firm performance (operating efficiencies) outcomes.

7.2 Contributions to Research and Management in the Public Administration context

A second contribution arises from empirically validating our theoretical framework in the context of governments. The lack of guidance for IT governance in the government context is troublesome. Whereas the nature and composition of IT governance has been extensively researched in for-profit corporations, there is no systematic empirical evidence that IT governance 'best practices' in for-profit corporations are entirely suitable for government operations (Kassahun et al. 2011). Outcomes of public sector reforms have in fact an impact on social and political dimensions that are not accounted for in private sector frameworks (Cordella and Iannacci 2010) such as the costs and quality of delivering essential public services. Governments also face particular institutional dynamics that have implications for the methods, models, principles, and lessons to be applied in public sector, such as multiple stakeholders with conflicting goals and higher political influences, and more comprehensive regulatory compliance and mandatory reporting requirements than for-profit firms face (Kassahun et al. 2011).

The empirical evidence that we obtained in the public administration context shows that until top managers develop a dynamic IT capability to resolve and navigate beyond the constraints of organizations' routinized patterns of technology enactment, organizations are unlikely to realize improved firm performance in terms of increased operating efficiencies. Three notable recommendations for public administration managers emerge from the empirical results that emphasize the need to understand firms' state of technology enactment when configuring IT governance mechanisms as follows.

1. A *common* problem in *all cases* is that dynamic IT capabilities are constrained until and unless executive management incorporates strategic objectives for IT-enabled business process change in the corporate strategic plan. Therefore, firms should enhance their dynamic IT capabilities by learning from higher performing peer firms that have incorporated a strategic vision for IT into corporate strategy.

2. Firms in the same state of technology enactment have a *common* need to implement more mature IT governance mechanisms. In this case, firms should enhance their dynamic IT capabilities by learning from higher performing peer firms that have implemented more mature IT governance mechanisms.

3. However, *which* mechanisms of evaluation and decision rights should be implemented is *idiosyncratic* to firms' state of technology enactment:

    a) Firms navigating through state 1 should emphasize cost savings, which can promote rationalization/standardization of IT infrastructure. Firms navigating state 2 should emphasize cost and quality of business operations, which can promote IT enactment in support of integrated enterprise business processes. Firms navigating through state 3 should emphasize innovative service delivery when and where customers want it, which can promote modularized, configurable sets of IT-enabled business processes.

    b) Firms navigating state 1 should empower CIOs with *acquisition* decision authority to direct IT investments to shared infrastructure. Firms navigating state 2 should empower CIOs with *acquisition* decision authority to direct IT investments to integrated enterprise systems. Firms navigating state 3 should emphasize decision rights and accountability of business departments for the *design* and *performance* of IT-enabled business processes, thereby highlighting IT users' responsibilities to leverage integrated enterprise systems in practice.

While our study contributes insight into the significance of IT governance to intra-organizational transformation initiatives in government, there is a lack of guidance in the literature for government agencies trying transform into an integrated supply chain capable of providing seamless service delivery across multiple service providers (i.e., state 5 of capability maturity) (Irani et al. 2007). A tightly integrated inter-organizational relationship requires significant information exchange to support that relationship (Clemons and Row 1992; Premkumar et al. 2003). Reengineering IT-enabled inter-organizational processes is a complex undertaking in which a wide range of information and communication needs of all stakeholders need to be considered (Shah et al., 2002). Such a significant transformation requires comprehensive IT governance skills in strategic information systems planning in support of organizational change (Segars et al. 1998; Willcocks et al. 1997). Therefore, researchers need to devise IT governance guidance for inter-organizational transformation initiatives in government.

7.3 Contributions to Research: the IT artefact

A third contribution is that our empirical evidence presents a cautionary tale regarding a narrow focus on the IT artefact in the e-government literature. Governments have commissioned studies that produced a series of stage models

to explain the concept of e-government and to prescribe guidelines for implementing e-government (e.g., Dwivedi et al. 2011; Heeks and Stanforth 2007; Holden et al. 2003; Janssen and Van Veenstra 2005; Layne and Lee 2001; Lee 2010; Moon 2002; Reddick 2004; Siau and Long 2005; Singh et al. 2007; Valdés et al. 2011; Weerakkody et al. 2008; West 2004). Notwithstanding their contributions, e-government stage models essentially remain focused around IT capability, and in particular features of governments' website interfaces with citizens (Andersen et al. 2011; Irani et al. 2007; Lee 2010). Such a narrow focus on government websites (IT artefact) has led to the implicit assumption that IT is the driver of transformation to an e-government model (Andersen and Henriksen 2006; Heeks and Stanforth 2007). Our empirical evidence questions the assumption: we find that governments can acquire similar *technology* and provide the same *types* of service delivery *either* (1) through transformation to an efficient IT-enabled business model, *or* on the contrary (2) by using significantly more manual labour in support of service delivery while *eschewing* transformation to an IT-enabled business model. Therefore, the acquisition of similar IT and the ability to offer similar types of services through government websites is not necessarily a driver of, nor is it an accurate assessment of, transformation to an IT-enabled business model.

This finding has serious implications for the discourse on e-government (Jansen et al. 2010; Singh et al. 2007). To the extent that assessment of transformation to an IT-enabled service delivery (e-government) model is superficial when based upon the sophistication of government websites, the danger is that these assessments promote a "beauty contest" of nations' websites rather than promote real benefits for citizens by driving e-government transformation (Andersen et al. 2011). For example, a representative from a local government in the Netherlands stated "Like all agencies we want to be listed in the top ten of governmental website monitors. This means primarily enhancing the features of our website" (Janssen et al. 2008, p. 214). Such assumptions are troublesome in light of our empirical evidence, which shows that the technology focus will not improve public service delivery, such as reduce operating costs. Instead, the efforts of practitioners and researchers *should* be directed toward enterprise transformation to an IT-enabled business model characterized by highly integrated business processes, information flows and communications across multiple departments and back-office functions, as our empirical evidence shows. A model covering these aspects, such as the validated theoretical framework we advance in Figure 4.1, is useful to guide future research as well as policymakers making decisions about IT-enabled transformation initiatives (Luna-Reyes et al. 2012).

7.4 Contributions to Research: Levels of Analysis

A fourth contribution is that our study highlights the need for simultaneous attention to multiple levels of analysis and renewed practitioner and researcher attention to IT governance (i.e., organization-level) factors in dynamic IT capabilities as follows.

Prior research has shown that firm's ability to integrate, build, and reconfigure IT resources concurrently with organizational business process and managerial processes is sensitive to differences in prevailing regulative influences *between* countries/states. For example, prior research finds drivers of transformation arising from nationally legislated mandates to implement digital identity, land registry, new licensing requirements, protection of private data, or access to public authorities for all citizens (Strejcek and Theil 2002). Prior research also finds that incumbent country/province legislation can inhibit change in IT strategies. In Austria, for example, implementing digital communications with citizens required modifications to legal provisions by the federal parliament, and a restrictive constitutional rule on secret ballots blocked the transition to electronic voting (Strejcek and Theil 2002). Furthermore, normative differences *between* countries are also thought to affect transformation to an IT-enabled service delivery (e-government) model. For example, Nour et al. (2008) contend that less democratic societies exhibit more of an emphasis on pushing information to citizens in the most efficient manner or reducing the costs of transacting with citizens in public service delivery, whereas more democratic societies exhibit an emphasis on transparency, integrity and citizen participation in addition to efficiency.

Notwithstanding prior contributions to our understanding of *between* country/province factors, our study contributes insight into the significance of organization-level factors among local governments *within* a single country/province. For example, Canada is thought to provide an advantageous context for implementing IT-enabled government (e.g., rated top three among e-government initiatives around the world, United Nations 2010). However, we find that lack of consonant IT governance at the organization level can render public service delivery significantly more costly than other government organizations *within* the same 'advantageous' country/province context. Therefore, residing in an advantageous country/province context is not sufficient to predict how an IT-enabled service delivery (e-government) model is actually implemented. These findings suggest that a contingency or multi-level approach to e-government research is warranted in which the effects of country-level *and* organization-level factors are simultaneously measured or controlled in each study. The nine dimensions of organizational-level IT governance that we advanced in Table 4.1

and validated in this study can provide an important starting point for such research. Future quantitative research that measures the significance of the interaction between country-level and organization-level effects on IT-enabled transformation initiatives could contribute valuable insight to our growing body of knowledge. In addition to the opportunities for more multi-level analysis in e-government research, our findings suggest a need for more in-depth research into the underlying mechanisms of mimesis in the public service sector (i.e., industry-level effects) as follows.

7.5 Next Steps

Our findings of significant variances in technology enactment among firms that are subject to essentially the same institutional/industry pressures raises an important question regarding how firms in an industry engage in discourse by which they can explore and learn from each other about innovative IT and strategic IT initiatives. In a recent update of his seminal paper on dynamic capabilities, Teece (2007) identified such exploration capabilities as a vital enabling element of dynamic capabilities that complements firms' capabilities to exploit resources such as IT. Echoing the extant literature on diffusion of innovations and bandwagon (mimetic) pressures, the assertion is that external information from and about peer adopters generates social pressure to mimic the IT choices and strategic IT initiatives of other, presumably successful organizations (Wolf et al. 2012). This occurs, according to prior literature, because organizations closely monitor actions taken by others. They do so in order to identify successful IT and strategic IT initiatives applied by others and imitate those initiatives to achieve similar benefits (Son and Benbasat 2007). This imitative or "mimetic" isomorphism is thought to proceed through inter-organizational discourse, where boundary-spanners (CIOs in the case of discourse regarding IT, cf. Liang et al. 2007) learn from each other about innovative IT and strategic IT initiatives (Swanson and Ramiller 1997; 2004). The foregoing literature assumes that organizations learn to implement successful IT-enabled transformation initiatives from each other (Son and Benbasat 2007). In this case we would expect to find significant *homogeneity* (DiMaggio and Powell 1983) among local governments' implementation of IT and strategic IT initiatives. Instead, we find significant *heterogeneity*.

If local governments do *not* typically learn from each other, as our empirical results suggest they forego the benefits of learning how to replicate prior adopters' successes and how to avoid their mistakes (Nebus 2006). Learning from prior adopters' successes and how to avoid their mistakes is in the best interests of the organization. Therefore, it is in the best interests of government organizations to motivate their CIOs to undertake inter-organizational discourse regarding

promising IT and strategic IT initiatives. However the literature is silent regarding IT governance mechanisms that motivate extensive search for more rewarding IT and strategic IT initiatives. Further research is urgently needed to understand *(i) do CIOs seek advice from peer firms, and (ii) how can firms' IT governance motivate CIOs to mindfully seek advice in their external advice networks?* It is this research question that we take up in Part 2.

PART 2

EXPLORATORY DYNAMIC IT CAPABILITIES: CIOS' ADVICE NETWORKS AND IT GOVERNANCE

8.0 INTRODUCTION TO PART 2

As business and technology environments become increasingly complex and dynamic (Chen et al. 2010), interest is rising in firms' dynamic IT capabilities (Lim et al. 2011). Dynamic capabilities have come to refer to a higher order capability to integrate, build and reconfigure organizational resources and organizational routines in pursuit of performance advantages in a changing or uncertain environment (Barreto 2010; e.g., Eisenhardt and Martin 2000; Zollo and Winter 2002). Consistent with this definition *dynamic IT capabilities* can be defined as a firm's ability to (1) integrate, build, and reconfigure IT resources concurrently with (2) organizational business process and (3) managerial processes (4) in pursuit of performance advantages in a changing or uncertain environment (Lim et al. 2011).

Interest is also rising in dynamic capabilities *theory* due to its appealing potential to integrate and extend multiple rich streams of literature. Dynamic capabilities theory extends the resource-based view of the firm, for example, by explaining that it is firms' capabilities to integrate, build, and reconfigure resources (and not the mere possession or control or routine use of resources) that enable sustainable firm performance advantages in all but the most stable environments. In turn, dynamic capabilities theory extends evolutionary economics theory by proposing differences in firms' dynamic capabilities as sources of heterogeneous firm performance within the same external (market) environment. Dynamic capabilities theory also extends management theory by advancing a hierarchy of organizational capabilities to generate performance advantages, which states that (i) resources are the foundation or 'zero-order' element and the basis for organizational capabilities; (ii) operational capabilities are 'first-order' and based on systematically exploiting firm resources in order to earn a living for the firm in the present; (iii) dynamic capabilities are 'higher-order' and based on systematically exploring for emerging opportunities and adapting organizational capabilities in order to seize those opportunities (Agarwal and Selen 2009; Pavlou and El Sawy 2010; Teece et al. 1997; Wang et al. 2012; Winter 2003). Moreover, dynamic capabilities theory is well poised to benefit from and contribute to information systems literature, which strongly implicates firms' IT in how firms adapt or fail to adapt to the exigencies of changing or uncertain environments (e.g., Lu and Ramamurthy 2011; Tallon and Pinsonneault 2011; Wang et al. 2012).

Information technology (IT) has long been proposed as a key enabler of organizational capabilities in support of performance advantages for the firm (e.g., Mata et al. 1995). In pursuit of performance advantages, many organizations have

adopted enterprise resource planning (ERP) systems, which refers to IT that, when implemented across an enterprise, provides a standard platform for administrative functions that enables real-time integration of cross-functional business processes (Ranganathan and Brown 2006). To the extent that ERP integration efforts are successful, organizations should exhibit performance advantages such as improved operating efficiencies. For this reason, chief executive officers (CEOs) today are asking their chief information officers (CIOs) to play bigger roles in the organizational growth agenda (1) by building an integrated platform of business processes, information systems and technology that can be enacted in support of business processes (i.e., exploitation), and (2) by exploring for external advice regarding innovations that can enable faster, more agile responses to emerging opportunities (Cash et al. 2008; Lyytinen and Rose 2006). Our focus in this Part 2 study is on the latter role; the exploration element of dynamic capabilities (Helfat et al. 2007; Wang et al. 2012).

Exploration, as described in the technology diffusion (e.g., Rogers 2003) and institutional perspectives on enterprise IT adoption (e.g., Swanson and Ramiller 1997; 2004; Teo et al. 2011), proceeds as peer firms in an industry engage in inter-organizational communication by which they learn about and adopt particular technologies and strategic initiatives. A central thesis of these literatures is that executives (e.g., CIOs) obtain information from and about peer firms through inter-organizational discourse that enables them to model their firm after ("mimic") ostensibly higher performing firms in an effort to improve their own firms' financial performance (Angst et al. 2010; Liang et al. 2007; Mignerat and Rivard 2009). Both technology *providers* and technology *adopters* (e.g., peer firms) can participate in inter-organizational discourse (Chatterjee et al. 2001; Grover et al. 1993; Ross and Feeny 2003; Stephens et al. 1992). However, unlike market (i.e., provider/vendor) information, advice from peer firms based on their experiences implementing a technology within their firms is highly contextualized. Contextualized information emanating from admired peer firms (i.e., higher performing firms in the same institutional/industry context) in particular has great potential to improve firm performance embedded in that institutional/industry context (McEvily and Zaheer 1999). Our focus in this study, therefore, is on advice obtained from peer firms.

The IT and strategic IT initiatives of some peers will be better adapted to the exigencies of the environment than others (Teece 2007). In fact, the costs of implementing some IT/strategy innovations can outweigh the payoffs for the majority of adopters (Greve 2011). Consequently, implementation of IT/strategy innovations should not be embraced without careful deliberation of the focal firm's need, the alternatives, and their likely costs and payoffs, because even incremental change can be costly and disruptive to efficient operations.

Accordingly, the evaluative and inferential skill exhibited by a firm is an important quality that identifies firms' dynamic IT capabilities (Teece 2007).

For the foregoing reasons it is *mindfulness* – the accurate and discriminant perception during search and evaluation of opportunities emerging in the environment – that distinguishes firms' dynamic IT capabilities (Wolf et al. 2012) from other causes of variation in operational capabilities, such as ad hoc problem solving and chance (Lim et al. 2011). Mindfulness is manifest in search for technological and competitor (or peer) information from outside the firm, making sense of it, and figuring out the likely payoffs versus costs to the firm of integrating, building, and reconfiguring IT innovations concurrently with organizational business process and managerial processes (Teece 2007; Wolf et al. 2012). An implicit assumption of technology diffusion and institutional literatures is that executives engage in inter-organizational discourse (i.e., exploration) in order to interpret and evaluate the potential for IT innovations to improve their own firms' financial performance (e.g., Rogers 2003; Swanson and Ramiller 1997; 2004). This behaviour is considered mindful toward the best interests of the firm (Teo et al. 2011). However, management scholars question the assumption that executives seek advice in an effort to improve firm their firms' financial performance. Management scholars drawing on agency theory contend that executives are naturally motivated to act in their own self-interest, seeking information with which to defend their strategic decisions, rather than searching extensively for alternative technologies and strategies (McDonald et al. 2008) adopted by higher performing firms in an effort to improve their firms' financial performance (Angst et al. 2010; Mignerat and Rivard 2009). If firms do not learn about innovative technology and administrative structures from each other, they forego the opportunities to learn from prior adopters' successes and avoid their mistakes (Nebus 2006). This behaviour is considered "less-mindful" toward the best interests of the firm (Teo et al. 2011). Notwithstanding the interests of firms in motivating mindful advice seeking, the literature is silent with regards to managerial processes that, as part of dynamic IT capabilities (Lim et al. 2011), can motivate CIOs to mindful advice seeking. In order to ameliorate this gap in the literature, it is our contention in this study that *IT governance* (cf., Baptista et al. 2010; Cordella and Iannacci 2010; Huang et al. 2010; Jun and Weare 2011; Ross et al. 2006; Tiwana and Konsynski 2010) provides a context that motivates (or alternatively inhibits) the search for more rewarding IT and strategic IT initiatives. However, the literature presents no systematic empirical evidence by which to assess this conjecture. Therefore, the objective of this paper is to advance and empirically assess a theoretical framework of the advice networking processes underlying exploratory dynamic IT capabilities, in order to address the research question *(RQ2) (i) do CIOs seek advice from peer firms, and*

(ii) how can firms' IT governance motivate CIOs to mindfully seek advice in their external advice networks?

In order to address the research question, we drill down in Chapters 9.0 through 14.0 on the exploratory element of dynamic IT capabilities by examining the advice networking behaviours of CIOs. We adopt a positivist approach in order to test the significance of two IT governance mechanisms in motivating CIOs to search extensively for IT innovations and IT-enabled change initiatives that could contribute to improve firm performance: (1) executive monitoring, and (2) financial incentives. We also examine the contextual effects of (3) prior financial performance, and the context-contingent sensitivity of various configurations of IT governance mechanisms to (4) focal firms' state of technology enactment. The findings from this study elucidate how different IT governance configurations are needed to motivate mindful CIO advice seeking depending on focal-firm context. Implications for policymakers and promising avenues for future research close the empirical study for Part 2.

9.0 LITERATURE REVIEW

9.1 CIO Role in Dynamic IT Capabilities

Based upon a synthesis of the literature, IT governance has come to mean the selection and use of mechanisms for obtaining the required IT competencies to support and shape business strategy (Alaghehband and Rivard 2010). The formal distribution of decision rights and accountabilities for IT-related strategic decisions is a well-recognized example of mechanisms used in IT governance (Weill and Ross 2004). The top executive who is responsible for a firm's overall IT deployment and its operational use is called the IT director or chief information officer ("CIO", Banker et al. 2011). The CIO role is important because the degree to which IT investments contribute to organizational performance, such as operational efficiencies, depends on how IT is deployed and used by the organization in response to exigencies of the environment (Chen et al. 2010). For this reason, the CIO is the one executive that has decision rights, responsibility and day to day involvement with every dimension of IT governance in support of (1) corporate business strategy and (2) the operational strategies of all business subunits, as per the practitioner (e.g., ITGI 2008; ITGIOGC 2005) and academic literatures (e.g., Chen et al. 2010; Ross et al. 2006). Therefore, our focus in this study is on the CIO.

A review of the literature shows that the CIO role has evolved as the business and the technology environments have become increasingly complex and dynamic (Chen et al. 2010). The CIO today is expected to play not only the traditional role that focuses on exploiting existing IT competencies to support known business needs, but also a transformative role in dynamic IT capabilities that focuses on exploring for new opportunities that enable the firm to generate performance advantages (Chen et al. 2010; He and Wong 2004; Lewin and Volberda 1999; Lyytinen and Rose 2006). Exploration responsibilities involve search, discovery, and innovation that allow for business transformation. Exploitation responsibilities, in contrast, involve implementation, refinement, efficiency, and production. As elaborated next, executing CIOs' exploration responsibilities as a complement to traditional exploitation responsibilities is an important factor in sustainable firm performance.

The "traditional" *exploitation* responsibilities of the CIO role are directed at developing and supporting an IT infrastructure in support of known business needs (Henderson and Venkatraman 1993). Exploitation is based on routines, which allow the firm to refine, extend, and leverage existing competencies or to create new ones by incorporating new knowledge into its operations (Zahra and

George 2002). The establishment of routines ("routinization") is shaped through such diverse CIO responsibilities as coordinating IT-based projects (Ross and Feeny 2003), strategic planning (Segars et al. 1998), systems integration (Henderson and Venkatraman 1993), allocating and monitoring IT resources (Stephens et al. 1992), managing IT personnel (Applegate and Elam 1992), and setting policies, standards and protocols for information resources (Stephens et al. 1992). However, a persistent paradox of exploitation is that the inherent routinization leads to organizational inertia: the attachment to, and persistence of, recurrent behavioural patterns even if there were better alternatives and incentives to change (Polites and Karahanna 2012).

Routinization leads to organizational inertia by entrenching organizational practices (e.g., business processes) and causing them to become rigid (Besson and Rowe 2012; Polites and Karahanna 2012; Seo and Creed 2002; Sydow et al. 2009). Organizational inertia is an important practical and theoretical concept because it manifests, for example, in obsolete practices embedded in legacy hardware and software, vested interests in legacy ways of operating, strong norms, and overemphasis on taken-for-granted routines, all of which pre-empt consideration of alternative ways of operating. This leads to "blindspots": perceptual filtering routines by which actors attend to and select information that confirms their assumptions, while ignoring information that disconfirms their assumptions (Cunha and Chia 2007). These filtering routines reinforce the existing mind-set; they reduce ambiguity and provide a perception of orderliness that makes organisational life seem more predictable and, hence, more manageable. The key problem with these routines is that by producing a neatly ordered version of reality, they insulate firms from the messiness and complexities of the external environment (Choi and Wang 2009). This leads to a lack of awareness regarding critical external happenings such as threats and opportunities in emerging technologies and changing customer and regulatory demands. The lack of awareness leads to misalignment between the IT and the functioning of the organization in relation to the organization's environment (Baptista et al. 2010; Melville et al. 2004; Oliver 1991), which can bring about organizational failure (Cunha and Chia 2007). In this case, if the organization is to survive, it must go through radical change in technology and business processes in order to deliver new services or to comply with new regulatory processes, for instance (Besson and Rowe 2012; Greenwood and Hinings 1996; Wischnevsky and Damanpour 2006). However, radical change causes tremendous upheaval in work patterns, which causes service levels to depart significantly from established cost/quality standards, declining firm performance, and increased rates of organizational failure (Damanpour and Gopalakrishnan 2001; Wischnevsky and Damanpour 2006). Service organizations should, therefore, avoid radical changes

unless there are clear incentives to undertake them, or unless there are major risks in not doing so (Clemons and Hann 1999). In order to mitigate the foregoing risks of inertia, CIOs should execute on-going *exploration* responsibilities.

9.2 CIO Exploration Responsibilities in Dynamic IT Capabilities

The exploration responsibilities of the CIO role are directed at deriving strategic value from IT by enabling on-going incremental change as part of dynamic IT capabilities (Teece 2007). In this perspective, change implies overcoming organizational inertia in order to adapt the organization to mitigate emerging threats (e.g., changing regulations, customer demands) and take advantage of emerging opportunities (e.g., innovative IT) identified through exploration (Agarwal and Sambamurthy 2002; Guillemette and Paré 2012; Peppard and Ward 1999). CIOs contribute to transformation by interpreting the potential of IT to the organization in order to purposefully challenge entrenched IT-enabled routines, and thereby trigger the possibility of change in patterns of IT enactment (Du and Flynn 2010; Lines et al. 2011). Once the possibility of change is triggered, CIOs can direct the trajectory of change by redefining the vision, strategies and policies for IT use, by defining new IT-enabled business processes, and by educating users on the potential for using IT in support of redesigned business processes (Agarwal and Sambamurthy 2002; Chatterjee et al. 2001; Davidson 2006; Feeny et al. 1992; Guillemette and Paré 2012; Heracleous and Barrett 2001; Peppard and Ward 1999; Smaltz et al. 2006; Swanson and Ramiller 1997). In order to effectively trigger and direct transformation, CIOs need to remain informed on external developments in IT, strategies for using IT, and changes in institutional/industry demands (e.g., customer needs, regulations) through on-going scanning for information about the environment (Davidson 2006; Feeny et al. 1992; Swanson and Ramiller 1997).

9.3 CIO Advice Networks

CIOs are thought to remain informed about external developments in IT, strategies for using IT, and changes in institutional/industry factors through discourse in interpersonal networks with "relevant" external contacts (Ford and Ford 1994; Greve 2011; Heracleous and Barrett 2001; Rogers 2003; Sackmann 1989; Swanson and Ramiller 1997; 2004). As previously stated, our focus in this study is on external contacts with peer firms that have experience adopting strategic enterprise IT initiatives. The external advice network is constituted when the CIO decides which peer firms to turn to for advice (Nebus 2006). Access to peers in CIO's external advice networks, and the perspectives they formed through the experience of implementing an IT and strategic IT initiative in their

own context, can help CIOs to make sound judgments about the likely costs and payoffs in their own organization, when committing to the strategic IT initiative is best to take place, and how implementation can best be pursued (Greve 1998; Nebus 2006; Swanson and Ramiller 2004). Moreover, on-going search for advice in CIOs' external networks can enable on-going incremental change. On-going incremental change involves simultaneously managing small changes to technical systems and associated business processes, which mitigates the negative impacts on cost/quality of service, declining performance, and risks of organizational failure that accompany radical change (Bierly et al. 2009; Damanpour and Gopalakrishnan 2001; Wischnevsky and Damanpour 2006). Hence, on-going exploration in CIOs' advice networks can help organizations to remain viable over time by continually renewing the ability to adapt; that is, to maintain alignment between IT and the functioning of the organization in relation to the environment. Therefore, it is in the best interests of the firm to *motivate* CIOs to on-going advice seeking for more rewarding IT and strategic IT initiatives.

9.4 CIOs' Motivations for Advice Seeking

Motivations determine actors' efforts to search beyond the local boundaries of the firm for advice (Nebus 2006). Motivation in this context is a function of the perceived instrumentality of external advice; the perception that the information received is helpful in achieving a desired outcome (Nebus 2006). The motivation to improve firm performance, in particular, is central to the thesis of mimetic isomorphism, which states that (1) organizations within an industry come to imitate each other in the structures (e.g., technologies) and strategies they implement because (2) they learn from each other about particular technologies and strategies adopted by admired (i.e., higher performing) firms and mimic those firms' technology and strategy choices (DiMaggio and Powell 1983; Heracleous and Barrett 2001; Mignerat and Rivard 2009; Swanson and Ramiller 1997). In so doing, CIOs (1) can directly improve their own firm's financial performance, because higher performing firms have knowledge of more rewarding opportunities on which the seeker can capitalize (Angst et al. 2010; Burt 1997; Mignerat and Rivard 2009), and (2) can indirectly secure important resources for the firm by enhancing the perceived legitimacy of the firm (e.g., DiMaggio and Powell 1983; Son and Benbasat 2007; Suchman 1995). The instrumentalities of both motivations concern the best interests of the firm (George et al. 2006). This search behaviour can consequently be labelled "mindful" toward the best interests of the firm (Teo et al. 2011). However, management theorists raise important questions regarding the assumption that executives seek external advice in the best interests of the firm.

Management theorists contend that executives have a natural motivation toward an instrumentality of self-interest (McDonald and Westphal 2003; Munro and Stansbury 2009). In this view, executives are motivated to seek advice from peers in similar contexts, reasoning that their advice is likely to affirm and help defend the executives' current strategic decisions, whereas peers in different contexts are more likely to offer alternative and disconfirming advice (McDonald and Westphal 2003; cf. Hart et al. 2009). This reasoning would suggest that CIOs are motivated to seek advice from peers at firms with similar performance, rather than peers at admired, higher performing firms. The problem with this advice-seeking behaviour is that the CIO foregoes the payoffs of learning how to replicate more successful strategic IT decisions from higher performing firms, how to avoid pitfalls in the course of implementing a more successful strategic IT initiative, and how to make sound judgments about the likely costs and payoffs and when committing to the strategic IT initiative is best to take place (Greve 1998; Nebus 2006; Swanson and Ramiller 2004). In short, advice seeking motivated by an instrumentality of self-interest can expose the firm to agency costs in the form of poor strategic IT decisions. This behaviour occurs when executives are overcommitted to a current course of action (Polites and Karahanna 2012) because they have dedicated a lot of time and effort to deciding the current strategic plan (Hart et al. 2009), they have chosen the current strategy based on their core beliefs and values (Besson and Rowe 2012; McDonald and Westphal 2003), they are expected to explain their strategies publicly (Argyris 1990; Hart et al. 2009), or they have limited knowledge in new technologies (Huang 2007; Nebus 2006). In each case, executives' perceive a loss of control, which activates a deep-seated motivation to regain control (George et al. 2006). For example, Li (2009) finds CIOs overinvesting in legacy IT and reasoning that they are investing in a technology that falls within their established technical skillset (i.e., existing knowledge), which is therefore more manageable (i.e., regain control), even when information is available about IT opportunities that are likely to be more rewarding for the organization. This self-interested motivation consequently results in advice-seeking behaviour that can be labelled "less-mindful" toward the best interests of the firm (Teo et al. 2011).

10.0 THEORY DEVELOPMENT

Notwithstanding the interests of the firm in motivating CIOs to mindful advice seeking, the literature is silent with regards to managerial processes or mechanisms at firms' disposal that can motivate advice seeking for innovative IT and strategic IT initiatives that are more rewarding for the firm. In order to contribute deeper insight into the managerial processes or mechanisms that organizations use, we proceed to theorize and empirically assess the causal relationships between IT governance mechanisms and CIO's external advice seeking behaviours. The theoretical framework that we advance states that IT governance can have *direct* effects on CIOs' advice seeking behaviours, as well as *contingent* effects as an embedding context that influences CIOs' advice seeking behaviours. We then subject this theoretical framework to systematic empirical test. As such, the present study is the first to systematically and empirically examine the mechanisms by which CIOs are motivated (or not motivated) to access their advice networks and seek advice regarding innovative IT and strategic IT initiatives that are more rewarding for the organization. To that end, we present our theoretical framework for this study in Figure 10.1, and we elaborate the constructs of the theoretical framework as follows.

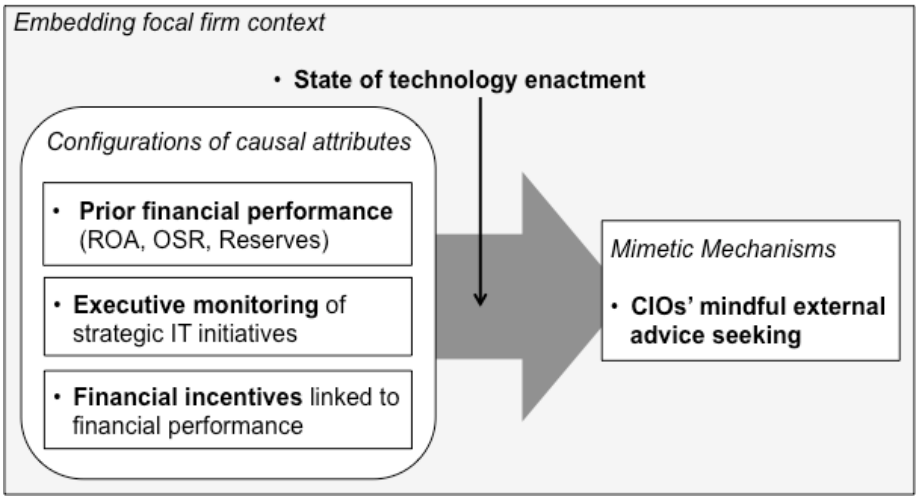

Figure 10.1 Theoretical framework of exploratory elements of dynamic IT capabilities: external advice seeking in CIOs' advice networks

10.1 External Advice Seeking Construct (Outcome)

The extant literature typically regards the transfer of information between actors through an objective lens: assuming that the information transferred holds the

same meaning to all actors (Miranda and Saunders 2003). Research in this view typically assessed information transfer in terms of the frequency of interactions between information seekers and sources, where higher frequencies of interaction are interpreted as higher occurrence of information transfer because its meaning is objective. However, the assumption of objective meaning is implausible when the meaning of information is closely tied to its originating context. When the meaning of information is rooted in a peer's experiences (e.g., implementing IT) in their own organizational context, its transfer requires deconstructing that information, putting it into a general form (e.g., discourse), and then reconstructing its meaning in the focal firm context (Dennis and Vessey 2005). The transfer of advice therefore involves subjective interpretation on the part of the advice seeker (focal firm), and its transfer is not complete unless and until the seeker can interpret the advice as intended by the source (Lin et al. 2005; Montazemi et al. 2012). High frequencies of interaction do not necessarily meet this criterion: data from controlled experiments show that high frequencies of interaction can reflect persistent misunderstanding between seekers and sources (Miranda and Saunders 2003), which results in nil information transfer (Lin et al. 2005; Montazemi et al. 2012). In order to eschew the limitations of frequency-based conceptualizations of information transfer, we adopt the alternative subjective view.

Our logic is based on the literature that adopts the subjective view in the context of mimetic behaviour, which states that meaning surrounding innovative technologies and strategic initiatives is socially constructed in discourse between firms in an industry (Fiol and O'Connor 2003; Rogers 2003; Swanson and Ramiller 1997). The social construction of meaning results in widely held perceptions that particular technologies and strategic initiatives are successful, which influences peer organizations to mimic each other by adopting that particular technology or strategic initiative. This perception may indeed accurately fit a focal firm's particular circumstances, leading to mimetic behaviours that are in the best interests of the focal firm. In contrast, the perception may lead to mimicry regardless of fit with the interests of the focal firm (Fiol and O'Connor 2003; Greve 2011). Hence, the accuracy of managers' perceptions regarding the value of advice emanating from a peer organization is central to understanding the transfer of advice from source to seeker, and to understanding how mimetic behaviour can be "mindful", in the best interests of the firm, or "less-mindful", respectively (Teo et al. 2011; Wolf et al. 2012). In this study, therefore, we conceptualize CIO advice seeking based on perceptual accuracy regarding advice emanating from a peer organization.

Perceptual accuracy concerns the level of error present in CIOs' perceived value of the external advice they receive. Type II error (i.e., the null hypothesis is false

but is accepted, cf. Kline 2011) would describe cases of less mindful behaviour where seekers have access to but fail to perceive the value of advice from peer firms where, in fact, IT choices and strategic IT initiatives have contributed to higher financial performance. By comparison, Type I error (i.e., the alternative hypothesis is false but is accepted, cf. Kline 2011) would describe cases of less mindful behaviour where advice seekers perceive the technology choices and strategic IT initiatives of a source firm as highly valuable, worthy of mimicking, when in fact the source firm's IT choices and strategic initiatives have produced relatively poor financial performance. Hence, mindfulness of advice seeking is manifested in perceptual accuracy along two dimensions comprising a 2x2 matrix that compares the relative fit (or misfit, i.e., Type I or II error) between the perceived and objective (i.e., actual relative financial performance) value of advice from a specific source, as depicted in Figure 10.2. We therefore conceptualize the mindfulness of CIOs' advice seeking behaviours as the fit between (1) the perceived value of source firm's advice as adjudged by the seeker (i.e. a subjective evaluation, cf. Tallon and Kraemer 2007), and (2) the source firm's actual financial performance relative to the seeker firm's actual financial performance (i.e., an objective evaluation, cf. Tallon and Kraemer 2007).

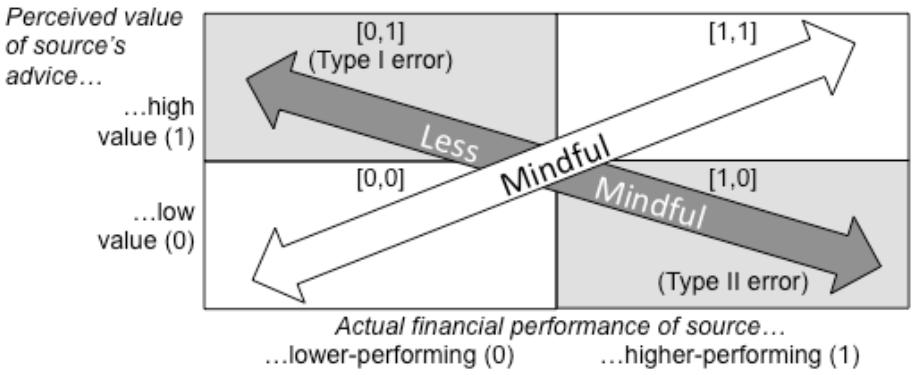

Figure 10.2 Conceptualization of mindful and less-mindful advice seeking based on perceptual accuracy

Whereas greater perceptual accuracy is clearly in the best interests of the firm, the requisite mindfulness in advice seeking entails an expanded search for advice on the part of CIOs that extends beyond information relevant to past events and past behaviours, or what others are doing (Fiol and O'Connor 2003). It entails a search for current information that may disconfirm, not only confirm, existing beliefs. Mindful interpretations necessitate regular efforts to update and expand awareness of multiple perspectives, which inform discriminating choices that best fit a firm's unique circumstances, rather than choices based indiscriminately on what others

are doing. In short, mindful advice seeking requires substantial time and effort on the part of the CIO. Therefore, it is in the best interests of the firm to motivate CIOs to actively engage in mindful external advice seeking. However, the literature is silent on how to do so. Next, we address the lack of relevant guidance in the literature by theorizing the antecedents and contingencies that can motivate CIOs to mindful advice seeking in the interests of the firm. We address the antecedents in terms of (1) prior financial performance, (2) executive monitoring, and (3) financial incentives, and we address contingency in terms of (4) focal firm state of technology enactment.

10.2 Focal Firm Context: Prior Financial Performance

A well-established precept in information systems literature is that uncertainty is an important factor that motivates actors to seek out more information (Daft and Lengel 1986). In increasingly complex and dynamic environments, actors are motivated to seek discourse with other actors as a means to overcome uncertainty (Faraj and Xiao 2006). This rationale suggests that CIOs' advice seeking behaviours can be predicted, in part, by the presence of sources of uncertainty. Management literature states that below-average firm financial performance is an important source of uncertainty that is likely to impel decision makers to search for information regarding more rewarding opportunities (Cyert and March 1963; McDonald and Westphal 2003). Below-average firm financial performance signals gaps between strategic IT decisions and the firm's performance requirements, which calls into question the veracity of the current strategy. To the extent that CIOs' beliefs about strategy are reflected in the firm's current strategy, they will feel uncertainty regarding their beliefs that informed their strategic decisions. This uncertainty evokes psychological distress and anxiety, which activates a deep-seated motive to restore a sense of certainty. In order to restore a sense of certainty, executives tend to seek external advice from executives at other firms in an effort to confirm or update their underlying interpretations of the environment. When actors have (or regain) a sense of certainty, they tend to stop searching for advice (Cross and Sproull 2004). This would suggest that CIOs' advice seeking behaviours can be predicted, in part, by firms' prior financial performance. Based on the foregoing literature, we can state the following hypothesis:

> Hypothesis 1 (H1). Firms' prior financial performance negatively influences CIOs to seek advice mindfully from peer firms.

10.3 IT Governance Mechanisms

In order to motivate CIOs to seek out more rewarding IT opportunities in the best interests of the firm, rather than taking a self-interested defensive approach to advice seeking, corporate governance researchers advocate for governance mechanisms that increase the alignment of executives' personal interests with the interests of the firm, key among which is strong firm financial performance (Daily et al. 2003; Jensen and Murphy 1990). Such alignment essentially increases the personal consequences to CIOs of meeting, or failing to meet, firm financial performance targets. Two general mechanisms for aligning CIOs' interests with the firms' interest in strong financial performance are (1) executive monitoring of CIOs' strategic decisions, and (2) financial incentives that are contingent on achieving their firms' financial performance objectives (Huang et al. 2010; Li 2009). In the discussion that follows, we develop theoretical arguments concerning how executive monitoring and performance-contingent financial incentives can enhance CIOs' efforts to seek advice in their networks in the best interests of their firms.

10.3.1 Executive Monitoring

One of the most common corporate governance mechanisms for monitoring and oversight of IT that has been examined in empirical research is the IT steering committee (Huang et al. 2010). The IT steering committee consists of senior executives from multiple areas of the firm that, collectively, have oversight to ensure that strategic IT initiatives are attuned to the firm's risk tolerance and strategic directions (Wilkin and Chenhall 2010). Participation in the IT steering committee enables the executive team to monitor IT impacts for deviations from the firm's interests and alter IT investments and strategic initiatives when necessary. Executives that vigilantly monitor strategic decision-makers do not simply defer to them or act as "rubber stamps" for their decisions (McDonald et al. 2008). Instead, they demand justifications and explanations for proposed strategic initiatives and constructively criticize proposed initiatives when they believe those initiatives are ill advised. Because executives can exercise oversight to the extent that they monitor and are aware of strategic IT decisions, they can ensure that the firm's interests have primacy over the potentially competing self-interests of strategic decision makers. Such oversight can motivate strategic decision-makers to make superior strategic choices that are likely to contribute to firm performance (Westphal 1999). Decision-makers are motivated to seek out a wider range of opinion on strategic issues when they are trying to make superior strategic decisions (McDonald et al. 2008). In particular, institutionalists assert, firms seeking to improve firm financial performance are especially likely to seek out higher performing firms as referents and to mimic their strategic decisions

(DiMaggio and Powell 1983; Haunschild and Miner 1997). Based on the foregoing literature we can advance the following hypothesis:

> Hypothesis 2 (H2). The level of executive monitoring positively influences CIOs to seek external advice mindfully from peer firms.

10.3.2 Financial Incentives

Corporate governance researchers also advocate for formalized governance mechanisms that increase the alignment of executives' personal interests with the interests of the firm, key among which is strong firm financial performance (Daily et al. 2003; Eisenhardt 1989a; Jensen and Murphy 1990). Formalized governance mechanisms are desirable because they can attenuate the need for overt exercise of power by senior executives to enforce the firm's interests, which is frequently avoided for fear it would mobilize opposition (Fiss 2008). Formalized governance mechanisms seek to promote an instrumentality of firm's best interests by aligning the interests of CIOs with the financial performance of the firm (Huang et al. 2010; Li 2009). The formal mechanisms of *financial incentives* are advocated for aligning CIOs' self-interests with the best interests of the firm as follows.

Empirical evidence demonstrates that when they are making decisions with significant personal consequences, actors are more motivated to search thoroughly for potential solutions and to consider alternative points of view (McDonald et al. 2008; cf. Petty and Wegener 1999). In order to enhance the significant personal consequences of executives' strategic decisions, corporate governance scholars adopting the agency perspective recommend linking financial incentives to improved firm financial performance. To the extent that executives receive financial rewards when their firms' financial performance improves, they are more willing to engage in behaviours that enhance firm financial performance (Beatty and Zajac 1994; Daily et al. 2003). To that end they are more motivated to make superior strategic decisions, and consequently they are motivated to seek out a wide range of opinion on strategic issues from peer firms (Fey and Furu 2008; McDonald et al. 2008). Because higher performing firms know about more rewarding opportunities (Burt 1997; Haunschild and Miner 1997), we would expect CIOs motivated by an instrumentality of improved firm performance to mindfully seek advice from higher performing firms. Based on the foregoing literature we can advance the following hypothesis:

> Hypothesis 3 (H3). The significance of a CIO's financial incentives linked to improved firm performance positively influences CIOs to seek external advice mindfully from peer firms.

The foregoing discussion focused on mechanisms of IT governance that are theorized to motivate CIOs' advice-seeking behaviours in the best interests of the firm. In the next section we discuss how alternative configurations of these mechanisms can be more salient in some firms than in others, depending on the focal firm context.

10.4 Focal Firm Context: State of Technology Enactment

Prior studies provide important insights into one configuration of IT governance mechanisms or another, its contributions to the organization, and ways in which it can be improved (Sabherwal and Chan 2001). However, the extant literature, with some notable exceptions (e.g., Lee et al. 2004; Sambamurthy and Zmud 1999; Weill and Ross 2004; Xue et al. 2012; Xue et al. 2008), largely views the same configuration of IT governance as useful in all situations, rather than examining multiple configurations in heterogeneous firm contexts (Sabherwal and Chan 2001). Overlooking context is problematic in studies of IT governance because the empirical record shows that no single IT governance configuration fits all firms (Gu et al. 2008; Sambamurthy and Zmud 1999). The historically enacted strategies, technologies and routines of a focal firm constitute a context that shapes how executives perceive the constraints and the potential affordances of ITs such as enterprise resource planning (ERP) systems (e.g., Lyytinen et al. 2009). The focal firm context carries this history in multiple ways: (1) technology choices are historically constrained through legacy systems and infrastructures; (2) actors' capabilities, skills, beliefs, and values are historically formed by past learning by doing, using or trying; and (3) routines and tasks are historically shaped by interactions with the environment. These histories lend the focal firm context an ostensive aspect; tacit rules abstracted from past experiences that actors draw upon to interpret the likely outcomes and entailments, the payoffs and costs, of alternative behavioural choices in the present (Feldman and Pentland 2003; Sydow et al. 2009). The ostensive aspect of focal firm context tends to reinforce the perceived value of incumbent ITs and past strategic choices, even when more efficient alternatives are available. Hence, CIOs' perceptual accuracy regarding the value of peers' chosen ITs and strategic IT initiatives – the dependent variable in this study – is broadly influenced by the focal firm context in which CIOs are embedded. In short, focal firm context matters in rendering such judgments.

Firm survival and growth in uncertain environments brings a range of management challenges. As environmental demands change and as firms increase in complexity, managers encounter a number of problems for which more sophisticated capabilities are required. These encounters are recognizable as 'tipping point' challenges (Gladwell 2000). "Tipping points are encountered during growth or are the consequence of environmental changes, and will depend

on the specific context of the firm in its environment. To continue growing, a firm must successfully resolve the challenges presented by the tipping point" (Phelps et al. 2007, p. 8). Encountering and resolving tipping points does not imply a linear, sequential, deterministic or invariant set of states as tends to be assumed in stage of life cycle theories[3] (Phelps et al. 2007). Nor do tipping points necessarily manifest as crises that disrupt periods of stability and require radical or revolutionary change as predicted by punctuated equilibrium theories (Besson and Rowe 2012). Rather, organizations' growth over time is conceptualized as the management of key transition states in coping with continuous and unpredictable change (Phelps et al. 2007).

In order to navigate beyond a tipping point, organizational structures must undergo a transformation, enabling the organization to face new tasks or problems that emerge. This transformation can be construed in terms of the acquisition of new knowledge (Phelps et al. 2007). In short, the firm must have the capability to acquire and apply new and requisite knowledge to resolve the new challenges encountered in a changing environment, which is conceptualized as firms' absorptive capacities (Cohen and Levinthal 1990). Extending the original conceptualization, Zahra and George (2002) distinguish between 'potential' and 'realised' absorptive capacity. 'Potential absorptive capacity' refers to the firm's acquisition and assimilation of external knowledge through exploration for new knowledge. 'Realised absorptive capacity' describes the transformation of existing knowledge by combining new knowledge to implement new operational capabilities. In the context of our study, the salient insight of the absorptive capacity concept is that firms differ in their capacities to apply new knowledge to *integrate, build, and reconfigure IT resources concurrently with organizational business process and managerial processes in pursuit of performance advantages in a changing or uncertain environment* (i.e., dynamic IT capabilities). Moreover, these differences in firms' capacities can be analysed through the lens of capability maturity models (Phelps et al. 2007). These models typically describe a process of moving from low or zero capability through developing capabilities that enable high performance, such as above-average operational efficiency. In the

[3] The notion that firms progress through stages of a life cycle in a linear, sequential, deterministic or invariant manner overlooks the heterogeneous, path-dependent nature of firm growth (Phelps et al. 2007). Scholars find that such stage of life cycle models have little or no empirical support when tested on large samples (Levie and Hay 1998). Rather, studies find that organizations experience expansion and contraction over time, and so unidirectional linear implications of organismic models are inappropriate (Vyakarnam et al. 2000). Studies also find many exceptions to stage of life cycle sequencing and find instead that many transitional paths are open to organizations (Miller and Friesen 1984). They also find evidence of recurrence, firms moving back down the sequence. Therefore, "firms over lengthy periods often fail to exhibit the common life-cycle progression" (Miller and Friesen 1984, p. 1176).

context of dynamic IT capabilities, five states of capability maturity can be synthesized from extant literature as follows (ITGI 2008; Jaklič and Štemberger 2009; Ross et al. 2006; SEI 2006; Valdés et al. 2011).

In state 1, *Initial*, IT-enabled operational responsibilities are ill defined, unstructured and localized in departments rather than the result of collaborative effort across departments. Consequently, the firm experiences problems with costs of acquiring, deploying, maintaining and supporting disparate silos of technology, and it faces the challenge of investing in rationalization and standardization of its hardware infrastructure. In state 2, *Repeatable*, IT-enabled operational responsibilities are defined and documented, but traditional localized modes of operating persist in departments. Consequently, the firm experiences problems coordinating business processes that cross multiple groups, and it faces the challenge of justifying high investment costs to replace legacy systems with integrated enterprise systems where the financial payoffs can be delayed for years. In state 3, *Defined*, IT-enabled operational responsibilities are defined that require cooperation between departments. Teams comprised of individuals from multiple departments are established in which individuals with authority are assigned responsibility for the operation and improvement of entire processes end-to-end. Many but not all core processes standardized and integrated across departments. Consequently, the firm experiences costs and delays in configuring IT support for new business configurations (e.g., innovative new services), and it faces the challenge of optimizing sets of IT-enabled business processes (i.e., ERP modules) in order to improve its agility to adapt to innovation opportunities. In state 4, *Managed*, organizational structures are based on end-to-end enterprise processes, and operational performance measures are applied to monitor enterprise processes. All core business processes are standardized and integrated in enterprise system "modules" that can be rapidly reconfigured to support new business configurations (e.g., innovative new services). The challenge the firm faces is to extend business processes and systems to rapidly incorporate business partners' business processes and systems without jeopardizing the integrity of the core business modules. In state 5, *Extended*, core business processes are fully modularized (i.e., in ERP modules), able to rapidly support supply chain integration by plugging in the essential modules. Hence, the basic intuition of a states of capability maturity perspective on organizational growth is that organizations encounter common tipping point challenges over time that result from a misalignment between incumbent operational capabilities (i.e., IT-enabled business processes, management processes) and the demands imposed by the environment (e.g., for seamless service delivery supported by integrated end-to-end enterprise processes). Navigating beyond these tipping point challenges

requires exploiting new knowledge to generate new and improved operational capabilities.

The salient insight of a "states" view of organizational growth in this study is that organizations at different states of technology enactment have accumulated qualitatively different experience in deploying and using IT: the ostensive aspect of focal firm contexts (Feldman and Pentland 2003). The ostensive, abstract rules drawn from experience in the focal firm context at a given state of technology enactment influence the perceptual accuracy of CIOs' evaluations of peers' IT choices and strategic IT initiatives – the dependent variable in this study. Based on the foregoing literature, we can advance our final hypothesis:

> Hypothesis 4 (H4). The configurations of IT governance mechanisms that influence CIOs to seek external advice mindfully from peer firms are contingent upon the organization's state of technology enactment.

11.0 RESEARCH METHOD AND FIELD CONTEXT

11.1 Field Context and Data Collection

As discussed in section 5.1 of this thesis, the need for dynamic capabilities to change operational capabilities is a reality in government, yet there is a paucity of guidance available from the literature to date (Bekkers 2007; Foley and Alfonso 2009; Pärna and von Tunzelmann 2007). In light of the need for more guidance, we assessed our theoretical framework and its four predictions (hypotheses) in the context of local governments in Canada. Local governments in Canada are *corporations* responsible for the administration of twelve public services: public administration, fire and police services, roadways, public transit, drinking water, wastewater, storm water management, solid waste management, parks and recreation, library services, and land use planning (MMHA 2010). The Chief Information Officer (CIO) is typically called an "IT director". These managers have been under tremendous pressure to reform traditional business models for public service delivery because they need to develop innovative ways to address fiscal restraints while fulfilling citizen demands for public service (Bekkers 2007; Foley and Alfonso 2009; Pärna and von Tunzelmann 2007). In addition, IT governance became a legally mandated element of corporate governance in 2008 with the passage of "National Instrument 52–109", the Canadian version of the Sarbanes-Oxley Act (Bart and Turel 2010). Thus, local governments in Canada provide a potentially rich context in which to study mechanisms of IT governance. Furthermore, local governments in Canada have a common industry association, the Municipal Information Systems Association (MISA), which has the explicit mandate to provide "a forum for the interchange of information between municipal representatives…leading to the more efficient use of municipal information systems" (misa.on.ca). Thus, local governments in Canada provide a potentially rich context in which to study CIOs' external advice networking behaviours with peers.

Data were collected from CIOs of local governments by means of a structured questionnaire, which consisted of pre-existing measures from the literature implemented in the form of a web-based survey. We obtained a database of potential survey respondents from LexisNexis. The original database had 505 English-speaking local governments across Canada that fit the MISA member profile (i.e., minimum $5.2 million in annual revenues). Using the MISA member profile assured us that the local governments recruited had sufficient scope for strategic IT initiatives that could potentially benefit from "the interchange of information between municipal representatives" (misa.on.ca), while excluding very small firms whose size could bias the analysis (Tallon 2010). We obtained

CIO contact details via telephone calls to each local government. Between January and May 2012 we mailed recruitment letters to the CIOs, which provided the address of the web survey and informed CIOs about the purpose of the study, measures to protect confidentiality, and entailments of participation, and we followed up with two rounds of mailers and/or emails. This resulted in survey responses from 106 local governments responding as potential advice seekers. The response rate of 21% compares favourably with recent unsolicited IS surveys that involved CIO respondents (e.g., Chen et al. 2010 (12%), Preston and Karahanna 2009 (10.4%), Tallon 2010 (11%), Tallon and Pinsonneault 2011 (15%), Tiwana and Konsynski 2010 (24.6%)). Data for seven respondents were incomplete and therefore dropped from further analysis, and data for 99 respondents remained.

Our chosen analytical method, fsQCA (described later), is intended to mathematically describe patterns (configurations) of causal effects in qualitative data that explain the sample of cases. However, it is also desirable to identify configurations that appear systematically and not as a result of chance. We therefore confirmed that our sample sizes for fsQCA meets or exceeds the 15 cases suggested by Marx (2006) who tested the sensitivity of fsQCA to sample sizes. This threshold is recommended because it can identify systematic patterns and reject random patterns (configurations) for models with five causal factors (i.e., our model).

Descriptive statistics for the final dataset are shown in Tables 11.1 and 11.2. Results from evaluating descriptive statistics of our sample versus the population using ANOVA show that the distribution of local governments in each province/territory by frequency (t=0.043) and percentage (t=1.000) did not differ significantly from the population (Table 11.1, columns A and B respectively). These results validate the representativeness of the sample with respect to the population of local governments in the original database. The frequency distribution of local governments by state of technology enactment showed that too few local governments had completed state 4 or state 5 to include in our analyses (4% and 0% of cases respectively, see Table 11.2). Therefore, our analyses focused on the 96% of firms in states 1, 2 or 3 of technology enactment. We then combined respondent data with archive data from audited annual financial reports for seekers and their named sources. The combined dataset represented 114 unique cases of peer-to-peer advice seeking (i.e., matched pair source-seeker dyads) for analysis.

Table 11.1 Frequency distribution of local governments by country/province

Country/ Province Code	(A) Frequency of Municipalities Sample vs.	Population	(B) Percentage of Municipalities Sample vs.	Population
AB	12	94	12.1%	18.6%
BC	17	86	17.2%	17.0%
MB	4	16	4.0%	3.2%
NB	1	14	1.0%	2.8%
NF	1	9	1.0%	1.8%
NW	1	1	1.0%	0.2%
NS	6	23	6.1%	4.6%
NU	1	11	1.0%	2.2%
ON	53	226	53.5%	44.8%
PE	0	3	0.0%	0.6%
SK	2	21	2.0%	4.2%
YK	1	1	1.0%	0.2%
Total	99	505	100.0%	100.0%
Difference test	$t =$ 0.043, $p > 0.05$		$t =$ 1.000, $p > 0.05$	

Table 11.2 Frequency distribution of local governments by state of technology enactment

State of technology enactment	Number of Municipalities	Percentage of Cases*
1	12	12%
2	39	39%
3	44	44%
4	4	4%
5	0	0%

Note: * percentages as displayed do not add to 100% due to rounding

We applied analysis of variance (ANOVA) (1) to compare the 99 *responding* organizations to the 406 *non-responding* organizations in the original database, and (2) to compare *early* respondents to *late* respondents (because people responding in later waves can be assumed to be proxies for non-respondents, Armstrong and Overton 1977). This process is recommended to address concerns that non-response (or self-selection) bias could introduce artefacts into mathematical analyses (Chen et al. 2010). For the first test, analysis of variances in size (in revenues) between our 99 respondents and the remaining 406 non-respondents in the population revealed no significant differences (F=2.722, difference not significant). For the second test, an early respondents group was created of the 76 out of 99 firms that completed the survey in response to the initial mailing and follow-up, while a late respondents group was created of the 23 out of 99 firms that completed the survey only after the last round of mailings were sent (e.g., Kearns and Sabherwal 2007). Analysis of variances between

responses of early and late respondents revealed no significant differences, as reported in Appendix B. Taken together, the foregoing results assured us that non-responses would not significantly bias our results (Chen et al. 2010).

11.2 Measure Operationalization

Structured survey questions and the pre-existing scales (instruments) drawn from extant literature are summarized in Appendix C. The scales (instruments) are elaborated next.

11.2.1 Identification of advice seeking dyads

We adopted the instrument that Cross and Sproull (2004) employed to identify dyads in the context of information seeking between firms. Specifically, our survey asked respondents to name the CIOs/IT directors at up to five peer local governments whom they believed were most helpful in providing advice (regarding enterprise IT acquisitions or strategic IT initiatives) in the past twelve months. Obtaining the names of advice sources allowed us to identify the seeker-source dyads (i.e., matched pairs) that comprise CIOs' advice networks for analysis.

11.2.2 External advice seeking construct (Outcome)

Following our proposed conceptualization of the external advice-seeking construct (i.e., perceptual accuracy), we next computed the relative fit between (1) the perceived value of source firm's advice as reported by the seeker in our structured questionnaire, versus (2) the source firm's actual financial performance relative to the seeker firm's actual financial performance.

We adopted the approach of Cross and Sproull (2004) to assess CIOs' *perceived value* of source firm's advice. The approach involves asking each respondent to assess the perceived helpfulness of the advice they acquired from each of their named advice sources. Because our objective was to assess the perceived value of advice vis-à-vis improving IT impacts on firm financial performance, we adopted a pre-existing survey question from an IT impacts survey that has been implemented by Tallon and Kraemer (2007) and Tallon (2010). These data provided the perceptual measures of the value of a source's advice based on implementing an IT and/or strategic IT initiative.

Extant literature conceptualizes specific financial measures of firm performance as *objective measures* of the value of IT to the firm (e.g., Banker et al. 2011; Kohli and Devaraj 2003; Tallon and Kraemer 2007). The basic intuition of

financial performance measures can be stated, based on a synthesis of prior literature, as follows: strategic IT investments and initiatives lead to IT impacts, and IT impacts to firm financial performance that can be assessed as financial ratios (Soh and Markus 1995; cf. Melville et al. 2004; Tallon and Pinsonneault 2011). We adopted three financial ratios that are used in public administration literature and whitepapers: ROA, OSR, and Reserves. The ratio of net revenues to total capital assets (return on assets or ROA), assesses efficiency by comparing net revenues earned to the capital investments required to earn that revenue, where higher net revenue earned relative to capital investments indicates operating efficiency (e.g., Banker et al. 2011; Tallon and Kraemer 2007; Tallon and Pinsonneault 2011). The ratio of locally generated revenues to gross revenues (own source revenues or OSR) indicates good fiscal health in that the costs of service delivery can be covered by revenues from the local constituents served, and low OSR indicates poor fiscal health in terms of a financial dependency on higher tiers of government (provincial, federal) for annual grants in order to cover the costs of service delivery (BMA 2009; Dahlberg and Johansson 1998). The ratio of funds reserved for financing future operations versus assets (Reserves) assesses fiscal health in terms of the firm's ability to finance on-going service delivery in the event of foreseen and unforeseen contingencies such as emergencies (BMA 2009; Dahlberg and Johansson 1998). We obtained the requisite data to compute each of the three ratios for each seeker and each named source from audited financial reports. The relative financial performance of the source versus seeker in each dyad was computed as the difference between source and seeker financial ratios. These data provided the objective measures (Banker et al. 2011; Kohli and Devaraj 2003; Tallon and Kraemer 2007) of the relative value that the source organization realized from implementing an IT and/or strategic IT initiative.

Perceptual accuracy was computed as the fit between the perceived value and objective value of source's advice in each dyad, consistent with our conceptualization (depicted in Figure 10.2 and discussed in section 10.1). Prior to computing the fit we converted perceptual and objective measures to indices ranging from 0.00 (lowest below-average measure) to 1.00 (highest above-average measure) in order to avoid artefacts caused by different scales. Perceptual accuracy was coded as the absolute difference (misfit) between perceived and objective measures, and reversed to obtain an index of perceptual accuracy ranging from '0.00-poorest fit (lowest perceptual accuracy)' to '1.00-best fit (highest perceptual accuracy)'.

11.2.3 Prior Financial Performance

The three financial ratios (ROA, OSR, Reserves) computed for each seeker firm were used to assess the effects of seeker firms' prior financial performance as a potential factor in external advice seeking behaviour (i.e., Hypothesis 1).

11.2.4 Executive Monitoring

Extant literature states that the IT steering committee functions as an executive "board" for IT-related activities in monitoring performance (Torkzadeh and Xia 1992). We adopted the pre-existing and validated 3-item instrument for measuring board/executive monitoring from Westphal (1999), which has been shown to have acceptable internal consistency and reliability (Carpenter and Westphal 2001; McDonald et al. 2008), in order to measure the extent of executive monitoring by the IT steering committee.

11.2.5 Financial Incentives

We adopted the pre-existing validated instrument from Minbaeva and Pedersen (2003) that asks respondents to indicate the extent to which (1) the firm uses performance-based compensation and (2) the performance-based compensation systems are closely linked to performance of the firm in terms of financial results (i.e., improved operating efficiencies). This instrument is designed to assess managers' motivations to seek advice based on the perceived significance of the financial reward *and* the link to financial performance outcomes.

11.2.6 Focal Firm Context: State of Technology Enactment

In the extant literature examining how IT is enacted in organizations in general (ITGI 2008; Ross et al. 2006) and in government organizations specifically (Dhillon et al. 2008; Huang and Tilley 2003; Irani et al. 2007; Jaklič and Štemberger 2009), firms are classified into states based on their level of IT-enabled business process maturity. A focal firm's level of business process maturity can be characterized as: (1) Ad-hoc and unstructured processes; processes are localized, isolated from other functional departments; (2) Basic processes are defined but processes are enacted in traditional fashion but there is no substantial change; (3) Many but not all core business processes are standardized and integrated across departments; (4) Organization has been restructured around end-to-end business processes; all core processes are standardized and integrated; (5) Supply chain is integrated; collaboration between our organization and our suppliers and partners is on the highest level. Therefore, in order to assess firms' states of technology enactment, we adopted an instrument

from Jaklič and Štemberger (2009) (cf. Lockamy III and McCormack 2004) that asks CIOs which of foregoing descriptions of enterprise business processes best characterize their organization at present. CIOs' responses were coded as nominal variables (1 through 5) in order to group firms in similar states for analysis.

11.2.7 Reliability and Validity

We presented the initial structured questionnaire to five experts (i.e., two industry association representatives and three municipal CIOs) and asked them to comment on the clarity of the questions and the meaningfulness of the language used in the survey instrument. Based on their feedback, we made minor changes to the questionnaire in order to fit the Canadian local government context (e.g., "efficiencies" are often referred to as "savings"). This step helped to ensure the face validity of the measurements of each construct (e.g., Plambeck and Weber 2009). We then administered the final version of the structured questionnaire.

Once data had been collected, we assessed the measurement reliability and convergent validity of our only multi-item measure, executive monitoring, in order to mitigate artefacts in our results due to measurement error. To that end we assessed corrected inter-item correlations and Cronbach's alpha. Because the three items comprising the executive monitoring measure exhibited good convergent validity (corrected inter-item correlations >= 0.60) and reliability (α=0.772), we were assured that measurement error would not introduce significant error into our results (Eisenhardt and Tabrizi 1995). Therefore, we coded an executive monitoring index based on the mean response to the three items for the purpose of analysis.

11.3 Primary Data Analysis and Results

In research examining dynamic capabilities, the elements comprising and shaping dynamic capabilities have messy, nonlinear, and discontinuous interactions that should not be treated independently (El Sawy et al. 2010). Rather, there is a need to capture the complex patterns of the dynamic interplay among these elements simultaneously in a holistic way. To capture that complexity and understand the role of dynamic IT capabilities as a source of strategic advantage, we need methodologies that capture this inherent complexity. Scholars contend that configurational analysis is an appropriate method that can fuel the next jump in IT/strategy understanding (El Sawy et al. 2010). For the foregoing reasons we adopted the analytic technique of configurational analysis.

In the configurational approach to research, "attributes are studied simultaneously in order to yield a detailed, holistic, integrated image of reality" and "data analysis

and theory building are geared to finding common natural clusters among the attributes studied" (Miller and Friesen 1984, p. 62). A configurational approach is uniquely suited for analysing antecedents (or "causal attributes" in the parlance of configurational analysis) in sets, such as sets of firms at different states of technology enactment, because it is based on a configurational understanding of how causal attributes *combine* to bring about outcomes. Furthermore, unlike traditional correlational approaches such as multiple regression and structural equation modelling, configurational analysis can handle significant levels of causal complexity (Fiss 2007; 2011; Ragin 2008; Ragin and Giesel 2008). For these reasons, configurational analysis is established in management and organization science (e.g., Bensaou and Venkatraman 1995; Fiss 2007; 2008; 2011; Meyer et al. 1993; Miller 1987; 1990; Ragin 2008) and has recently been adopted in the IS literature (e.g., Burton-Jones and Gallivan 2007; El Sawy et al. 2010). Our study employs a set-theoretic approach to configurational analysis that is based on fuzzy set qualitative comparative analysis ("fsQCA") (Ragin 2008). Set-theoretic analysis examines causal patterns by focusing on the set-subset relationship. For instance, in order to explain what configurations of IT governance mechanisms lead CIOs to mindful advice seeking, fsQCA examines the set of cases for which CIOs mindfully sought advice and then identifies the combinations of causal attributes associated with this outcome. fsQCA also examines *counterfactual* cases where individual causal attribute are present but the outcome is not, in order to weight the relative importance of individual causal attributes. fsQCA uses fuzzy set algebra and algorithms that allow the logical reduction of numerous, complex causal conditions into a reduced set of configurations that lead to the outcome. In contrast to Boolean set algebraic methods, fuzzy set algebra is not restricted to simple set memberships of 0 or 1, but instead more precisely defines degrees of membership of individual case attributes in the outcome variable of interest using continuous values that range from 0.00 to 1.00 (Fiss 2007). To accomplish this identification of causal attributes mathematically, fsQCA proceeds in three steps that have been established in the organizational literature to ensure rigour in configurational analysis (Crilly 2010; Fiss 2011; Ragin and Giesel 2008):

1) Measures of independent and dependent attributes are *transformed* into sets and calibrated based on the extent of membership, or non-membership, in each set.

2) A data matrix known as a *truth table* is computed from these measures that lists all possible combinations of causal attributes.

3) An algorithm based on fuzzy set algebra is used to logically reduce the truth table combinations to simplified causal *configurations*.

11.3.1 Transformation of Measures

We transformed measures of independent and dependent attributes into fuzzy sets, calibrated by applying the direct method (Ragin and Giesel 2008). In the direct method the researcher transforms measures in the data set into fuzzy-set membership scales. Different levels of membership in a set were assessed based on (1) an upper bound, representing full membership, (2) a lower bound, representing full non-membership, and (3) a midpoint, representing values of maximum ambiguity or fuzziness (Fiss 2011; Ragin and Giesel 2008; e.g., Crilly 2010). Consequently, we calibrated *prior financial performance* (ROA, OSR, Reserves) of seekers to above-average performance, representing full membership, below-average performance, representing full non-membership, and the midpoint as the point of maximum ambiguity (fuzziness) of membership. We calibrated *executive monitoring* to above-average monitoring, representing full membership, complete absence of monitoring, representing full non-membership, and the midpoint as the point of maximum ambiguity (fuzziness) of membership. We calibrated the significance of efficiency-based *financial incentives* to above-average, representing full membership, complete absence of rewards, representing full non-membership, and the midpoint as the point of maximum ambiguity (fuzziness) of membership. Finally we calibrated the outcome variables, *mindfulness of advice seeking* to above-average mindfulness (75th percentile), representing full membership, below-average mindfulness (25th percentile), representing full non-membership, and the midpoint as the point of maximum ambiguity (fuzziness) of membership (e.g., Crilly 2010). The transformed data enabled us to analyse cases in sets that exhibit similar versus counterfactual causal attributes in the following steps.

11.3.2 Fuzzy-set Truth Table

We computed a data matrix known as a truth table from the foregoing measures with 2^k rows, where k is the number of causal attributes (i.e., antecedents) used in the analysis (Fiss 2011). Each row of this table is associated with a specific combination of causal attributes (each coded 1 if present, 0 if absent, in a given combination). Hence, the truth table lists all possible combinations of causal attributes. The empirical cases are sorted into the rows of this truth table on the basis of the presence (or absence) of causal attributes *and* the presence of the outcome variable. Some rows contain many cases, some rows just a few, and some rows contain no cases if there is no empirical instance of the respective combination of causal attributes associated with the outcome. Next, the number of rows was reduced in line with two conditions: (1) the minimum number of cases required for a combination to be considered and (2) the minimum consistency of a combination.

Consistency gauges the degree to which the cases sharing a given combination of causal attributes exhibit the focal outcome (Fiss 2011; Ragin 2008). The assessment of consistency is important in the analysis of relations in a set-theoretic analysis much the same way that assessment of statistical significance is important in the analysis of relations in a correlational method such as multiple-regression. Consistency, like significance, signals whether an empirical connection merits the close attention of the researcher. If a hypothesized causal relation is not consistent, then the researcher's hypothesis is not supported. Consistency can be estimated, when using fuzzy sets, as the proportion of cases that exhibit a given combination of attributes *and* the outcome, divided by the number of cases that exhibit the same combination of attributes but do *not* exhibit the outcome. To that end, the current study uses the fuzzy set truth table algorithm described by Ragin and Giesel (2008).

The fuzzy set truth table algorithm is based on a counterfactual analysis of causal conditions, which has the advantage of allowing for a categorization of causal conditions into "core" causes, which are essential, and "peripheral" causes, which can be less important on their own but important when acting in combination (Fiss 2011). We computed fuzzy-set truth tables by importing data into fsQCA 2.5 software (Ragin et al. 2006), filtering for all cases where the seeker firm is in one state of technology enactment (1, 2, 3 respectively), and then generating the fuzzy truth table. Consistent with agreed upon standards in the extant literature, the rows of the truth table were reduced to rows that represent 80%-90% of empirical cases and that exhibit a consistency of at least 0.80 (e.g., Fiss 2011), which is above the minimum recommended consistency threshold (Crilly 2010; Ragin 2006). This process enables the algorithm in the next step to give stronger weight to combinations with strong consistency of evidence (i.e., where most cases have strong membership in the set of cases exhibiting the outcome variable) and less weight to combinations where cases have midrange or low membership.

11.3.3 Computing Causal Configurations

The final step involves using a fuzzy set algorithm to evaluate the remaining rows (combinations) of the truth table in order to arrive at a more parsimonious understanding of the causal attributes. To that end we employed the Ragin and Giesel (2008) fuzzy set truth table algorithm, which computes multiple causal configurations that can explain the outcome variable. The logically simplest configuration is labelled the "parsimonious solution", which contains only those causal attributes that are *core* by reducing all combinations of causal attributes where any counterfactual case exists and retaining only those combinations of causal attributes that occur along with the outcome in all cases. The parsimonious solution has the advantage of identifying the most important causal attributes, but

does not shed light on the causal effects of other causal attributes that can be less important on their own but have important effects in combinations.

To overcome the foregoing limitation, we also computed the "intermediate solution". The intermediate solution considers cases with the presence of the outcome variable where (1) individual causal attributes are present and (2) weights them against counterfactual cases where the respective causal attributes are absent. Fuzzy set analysis treats the *absence* of a cause with the same logical status as the *presence* of a cause: through fuzzy set multiplication present and absent attributes are combined (Ragin and Giesel 2008). Thus, in fuzzy set -based qualitative comparison, causal attributes are not viewed in isolation but within the context of the presence and absence of other causal attributes. The intermediate solution thus contains not only core but also *peripheral* causal attributes that are weighted according to the supporting and counterfactual evidence for each causal attribute. The intermediate solution therefore identifies, based on the empirical evidence, multiple *configurations* of peripheral causal attributes that can explain the outcome (Crilly 2010).

In order to assess the degree to which a particular combination of causal attributes accounts for instances of an outcome, we assessed the "coverage" of each attribute and configuration of attributes (Fiss 2007; 2011; Ragin 2008; Ragin and Giesel 2008). Like partial R^2 in multiple regression analysis of a correlation, "coverage" indicates the empirical relevance or importance of a set-theoretic relation. As it is possible in a correlational analysis to have a significant but weak correlation, it is possible in a set-theoretic analysis to have a combination of causal attributes that is highly consistent but low in coverage (Ragin 2008). Therefore, we will use measures of consistency *and* coverage to indicate the empirical importance of each of the causal combinations in the parsimonious and intermediate solutions in our analysis.

12.0 RESULTS

In accordance with the foregoing protocol, we computed causal configurations based on 9 truth tables: 3 different outcome measures (i.e., mindful advice seeking based on ROA, OSR and Reserves ratios respectively) x 3 sets of firms at different states of technology enactment. The nine resulting truth tables are presented in Appendix D. Three of the nine truth tables were dropped from further analysis because insufficient cases met the minimum consistency criterion of 0.80 (Fiss 2011; Ragin 2006; 2008). This left six truth tables for further analysis: two truth tables for firms in each of the three states of technology enactment. Based on these data, we proceeded to compute the causal configurations that explain CIOs' mindful advice seeking.

We produced two relevant reports for each analysis using fsQCA 2.5 (Ragin et al. 2006) in accordance with Ragin and Giesel (2008): (1) the core solution, which shows causal attributes present in all cases that exhibit the outcome *mindful advice seeking*, and (2) the parsimonious solution, which weighs counterfactual cases against supporting cases for each combination and then identifies the causal attributes that can, in combination with other attributes, have an important effect on the outcome. In accordance with the reporting protocol of prior literature (e.g., Crilly 2010; Fiss 2011), the core and peripheral causal attributes that emerged from fsQCA are depicted with large and small circles respectively in Table 11.3. A shaded circle denotes a causal attribute that, when *present*, has a causal effect on the outcome, mindful advice seeking. A circle crossed out denotes a causal attribute that when *absent* (or low) has a causal effect on the outcome. Hence, the six columns in Table 11.3 labelled C1, C2… C6 depict six alternative configurations of causal attributes that in combination (i.e., logical AND relationships) with each other explain the outcome, CIOs' mindful advice seeking, for firms at a given state of technology enactment.

Redundant configurations of core and peripheral variables have been combined for presentation (in Table 11.3) in the interest of parsimony (Ragin and Giesel 2008). Consequently, the coverage for each configuration (i.e., the explanatory power of a causal configuration) reported in Table 11.3 is the *minimum* coverage based on core causal attributes only. Coverage estimates the proportion of cases where the outcome can be explained by the respective configuration of causal attributes. Furthermore, all causal configurations reported in Table 11.5 exceed the minimum configuration consistency threshold of 0.75 (Ragin 2006). Exceeding the consistency threshold indicates that the configurations have explanatory power, in the parlance of configurational analysis.

Table 11.3 Results of configurational analyses

Firms in:	**State 1**		**State 2**		**State 3**	
Causal Configurations:	C1	C2	C3	C4	C5	C6
Causal Attributes:	OSR	RESV	ROA	RESV	ROA	OSR
Prior Financial Performance (ROA)	●		⊗	⊗		●
(OSR)	●		⊗	⊗		⊗
(Reserves)	●	●	●	⊗		⊗
Executive Monitoring	•	•	•	●		●
Financial Incentives	n/a	n/a	⊗	⊗	●	●
Configuration Coverage:	0.53	0.59	0.29	0.44	0.29	0.82
Configuration Consistency:	> 0.75	> 0.75	> 0.75	> 0.75	> 0.75	> 0.75

Notes
● = core causal condition (attribute present)
⊗ = core causal condition (attribute absent)
• = peripheral causal condition (attribute present)
⊗ = peripheral causal condition (attribute absent)

n/a = Insufficient cases have this causal condition to test
ROA = Respective configuration is based on mindfulness assessed in terms of relative ROA of source versus perceived significance of source's advice
OSR = Respective configuration is based on mindfulness assessed in terms of relative OSR of source versus perceived significance of source's advice
RESV = Respective configuration is based on mindfulness assessed in terms of relative cash reserves of source versus perceived significance of source's advice

13.0 DISCUSSION OF RESULTS

The basic premise of this study is that dynamic IT capabilities are 'higher-order' organizational capabilities based on systematically exploring externally for emerging opportunities and adapting the organization to exploit those opportunities in practice. We examined mechanisms underlying the exploration element of dynamic IT capabilities. Whereas prior research in the technology diffusion and institutional (mimesis) views of IT adoption implicitly assume that CIOs participate in advice networks that enable on-going discourse between peers in an industry in an effort to improve firm performance, management scholars question CIOs' motivation to do so. Notwithstanding firms' interests in motivating CIOs to mindfully seek advice regarding more rewarding IT and strategic IT initiatives, the literature has been silent with regards to managerial processes or mechanisms that can motivate mindful advice seeking. The objective of our study was to ameliorate this gap in the literature by advancing a theoretical framework (depicted in Figure 10.1) and testing the framework in systematic empirical study to address the two-part research question: *(i) do CIOs seek advice from peer firms, and (ii) how can firms' IT governance motivate CIOs to mindfully seek advice in their external advice networks?* Next we discuss the findings that emerge from our empirical study and important implications for the discourse on dynamic capabilities.

13.1 Do CIOs Seek Advice from Peer Firms?

In response to the first part of our research question, *do CIOs seek advice from peer firms,* our empirical data shows that 58.6% of local government CIOs did *not* participate in an external advice network with peers. This result shows that we *should not* simply assume that CIOs learn from each other about innovative IT and strategic IT initiatives that can help to improve firm performance. The implication for future research is that advice seeking among peers should be directly evaluated in empirical research that draws on theories of dynamic capabilities, mimesis or technology diffusion, rather than merely assumed. More research examining the micro-level mechanisms underlying the exploration elements of dynamic IT capabilities is clearly warranted to complement our current understanding of dynamic capabilities, mimesis and technology diffusion, which has been predominantly informed by prior research at more macro industry- or network-levels of analysis. Our findings demonstrate the causal significance of factors specific to inter-organizational dyads that can be easily overlooked by macro-level analyses.

If the foregoing results reflect an overemphasis on exploitation without exploration by the non-seekers, scholars propose that the respective organizations will be exposed to important risks: (1) growth in IT usage beyond capacity, (2) unintended use of IT, (3) fading link from IT to strategy, (4) IT perceived merely as infrastructure, and/or (5) a false sense of security with respect to IT (Baptista et al. 2010). In an effort to gain further insight into the risks of exploitation without exploration, we conducted post-hoc analysis in the form of interviews with five of the non-seekers in which we asked CIOs to describe in their own words how strategic IT initiatives are budgeted (i.e., justified), and how IT is used. Evidence of all five risks emerged from the interviews, as the following examples attest. One local government noted that funding an IT initiative for one department led to significant unforeseen demand from other departments to use the new system. However, the firm had not budgeted for software licenses, maintenance and technical support investments to support the additional users, or to integrate data from the new system with incompatible legacy systems in other departments (i.e., growth in IT usage beyond capacity). Another local government recounted how users in one department bypassed protocols intended to ensure the security and privacy of sensitive information by routinely sharing their computer passwords with each other so that they could cover for each other when they were busy or absent (i.e., unintended use of IT). A recurring theme in interviews was how local government CIOs tapped into funds from higher tier governments designated for financing rural network infrastructures in order to finance necessary upgrades for legacy systems (i.e., IT as merely infrastructure), because the local councillors and executives saw no strategic value in investing more money in IT (i.e., fading link to strategy). The CIOs also agreed that councillors and senior executives had very little understanding of the dependency of the organization on IT unless and until a technical outage occurred (i.e., false sense of security). Perhaps the most troubling aspect of each of the evident risk conditions is that peer organizations existed that had already resolved the same issues. By foregoing exploration in their external advice networks, the non-seekers have foregone the payoffs of learning to replicate peers' successes and avoid their mistakes (McEvily and Zaheer 1999). It is therefore in firms' best interests to motivate external advice seeking, which leads to our second research question.

13.2 How can IT Governance Motivate Mindful External Advice Seeking?

Results from configurational analysis address the second part of our research question: *how can firms' IT governance motivate CIOs to mindfully seek advice in their external advice networks?* The results, presented in columns C1 through C6 of Table 11.3, demonstrate antecedent and contextual conditions of IT governance

that can motivate CIOs to seek advice in their external advice networks regarding IT choices and strategic IT initiatives that can help to improve firm performance. Our results show that:

1. CIOs in firms in state 1 of technology enactment are motivated to mindful advice seeking (a dynamic IT capability) when the seeker firm has above-average efficiency (ROA), independence from grants from higher-tier governments (OSR), and cash reserves, and the effect is enhanced by executive monitoring of IT impacts (column C1). The latter two conditions, cash reserves and executive monitoring, are sufficient to motivate advice seeking from peers with higher cash reserves (column C2). The finding that prior financial performance has a *positive* relationship with mindful advice seeking for state 1 firms contradicts our predicted negative effect (Hypothesis H1, which we discuss below).

2. CIOs in firms in state 2 of technology enactment are motivated to mindful advice seeking (a dynamic IT capability) when their firm has below-average operating efficiencies (ROA) and OSR (i.e., high dependency on grants from higher tiers of government), and when executives actively monitor IT impacts on firm performance (column C3), as predicted. In some but not all cases having high cash reserves on hand further *positively* motivates mindful advice seeking (C4), contrary to our prediction (Hypothesis H1, which we discuss below). Furthermore, financial incentives linked to efficiency have a *negative* effect on mindful advice seeking in state 2 firms, contrary to our prediction (Hypothesis H3, which we discuss below).

3. For CIOs at firms in state 3 of technology enactment, financial incentives linked to efficiency have a strong motivating effect (column C5) on mindful advice seeking (a dynamic IT capability), as predicted. The effect is *positively* enhanced when the firm has above-average operating efficiency (ROA, contrary to Hypothesis H1, which we discuss below), but high dependency on grants from higher-tier governments (poor OSR), poor reserves, and executives actively monitoring IT impacts on firm performance (Column C6).

Whereas these results can provide guidance for practitioners and policy makers, the findings for Hypotheses H1, H2, H3 and H4 warrant further analysis as follows.

Findings for Hypothesis H1 concerning prior firm performance exhibited opposing directions of effect in firms at different states of technology enactment.

For example, CIOs embedded in the context of firms in state 1 of technology enactment that engage in mindful advice seeking typically have *above-average* financial performance (i.e., a positive effect, contrary to Hypothesis H1), whereas *below-average* financial performance can motivate mindful advice seeking (a negative effect, as predicted) in state 2 and 3 firms. The positive effect is consistent, however, with conjecture in the extant literature when we consider the focal firm context. The conjecture in extant literature is that firms "performing relatively poorly may be preoccupied with their competitive *disadvantage.* A firm in this category, concluding that it has fallen behind others in innovating with IT, may come to disparage its own competence in this arena. As a consequence, in contemplating the innovative activities of others, it may be more inclined to look for models to slavishly emulate than to critically appropriate for local fit" (Swanson and Ramiller 2004, p. 573). For practitioners, this finding suggests that below-average performing firms in state 1 of technology enactment can be difficult to engage in industry discourse, and consequently industry associations and/or higher tiers of government need to adopt different approaches to reach and educate these firms. For researchers, this conclusion suggests that more research is needed to understand how to engage below average performing state 1 firms in learning how to use IT to improve firm performance from higher performing peer firms in their industry. The sensitivity of the prior firm performance effect (H1) to focal firm context provides support for Hypothesis H4.

Five of the six configurations support Hypothesis H2, which predicted a positive effect from executive monitoring, as either a core or peripheral factor that motivates CIO advice seeking. It is noteworthy that the only exception, configuration C5, does not present counterfactual evidence, but rather shows that financial incentives are sufficient on their own to motivate CIOs in firms in state 3 of technology enactment to seek advice from higher efficiency (ROA) peer firms. Hence, we found strong support for Hypothesis H2. Furthermore, the sensitivity of the prior firm performance effect (H2) to focal firm context provides support for Hypothesis H4.

Findings for Hypothesis H3 concerning financial incentives exhibited opposing directions of effect in firms at different states of technology enactment. For example, in the context of firms in state 2 of technology enactment, financial incentives linked to efficiency have a *negative* effect on mindful advice seeking (contrary to the predicted effect), whereas the effect is *positive* (as predicted) in state 3 firms. The negative effect is consistent, however, with conjecture in the extant literature when we consider the focal firm context. The conjecture in extant literature is that firms in state 2 have rationalized and consolidated their IT hardware infrastructure (i.e., servers, networks), which is typically driven by the need to reduce the costs of acquiring, deploying and maintaining disparate silos of

hardware (Ross et al. 2006). For this reason, aligning CIO interests with efficiencies such as costs reductions can be an effective mechanism for firms in state 1 of technology enactment (i.e., facing the challenge of moving from business silos to a standardized infrastructure). However, firms in state 2 face the challenge of investing in new integrated enterprise systems such as ERP. The implementation of ERP incurs high costs that include but are not limited to software licenses, maintenance, project management, change management, and user training, and the financial payoffs can be delayed for years. In this case, tying CIOs' financial incentives to short-term improvements in financial results will have the opposite of the intended effect: it will ensure that CIOs' personal interests are misaligned and directly conflict with the best interests of the firm to make the necessary investments in ERP. This finding underscores the need for practicing executives and policy makers to actively align incentive plans with the changing needs of the firm and to avoid relying on a single approach if the firm is to motivate CIOs to actively pursue advice in the best interests of the firm. The sensitivity of the financial incentives effect (H3) to focal firm context provides support for Hypothesis H4.

For researchers, the foregoing results underscore the need to attend to focal firm context (Hypothesis H4) when examining the motivating effects of IT governance configurations. The proposed theoretical framework, with its operationalization of focal firm contexts, demonstrates sensitivity to differences in empirical context and advances a foundation for future research in the context of mimesis and diffusion of technologies. The results also underscore the value of *configurational analysis* based on focal firm context: the finding that prior financial performance, executive monitoring and financial incentives effects interact and combine in ways that depend on state of technology enactment would not be accurately identified if the antecedent measures had been aggregated for variance-based analysis such as structural equation modelling.

14.0 IMPLICATIONS FOR THEORY

One contribution of this study is that configurational theories for dynamic capabilities can be complemented by process theories, particularly once initial configurations have been identified as in Table 11.3 (El Sawy et al. 2010). Each configuration can then be explored using a process view to examine its appearance, increasing its salience, and enhancing its relevance in terms of the outcomes of improving firm performance. The theoretical framework advanced in this study (depicted in Figure 10.1) can also contribute conceptual coherence to streams of research concerning mindfulness in the face of bandwagons, organizational transformation, and coordination of exploration as follows.

14.1 Operationalizing Mindfulness in the Face of Bandwagons

A second contribution of this study concerns the progress beyond the abstract conceptualizations of *mindfulness* advanced in seminal literature on the topic (e.g., Fiol and O'Connor 2003; Levinthal and Rerup 2006; Weick and Sutcliffe 2006) to an operational definition of mindfulness based on perceptual accuracy. Prior abstract conceptualizations of mindfulness that are difficult to operationalize are problematic because they have led to, for example, contradictory interpretations of mimetic behaviour in the face of bandwagons. On one hand, mimesis is characterized in the literature as an irrational, undiscriminating, unquestioning, unreflective, automatic or *less-mindful* behaviour (e.g., Gosain 2004; Lounsbury 2008; Tolbert and Zucker 1983). Scholars making this characterization conclude that firms tend to mimic the decisions of other firms in order to avoid cognitive efforts to overcome uncertainty surrounding the costs and payoffs of an innovation and for the symbolism of the act – to avoid being perceived as laggards – rather than rational deliberation (e.g., Suchman 1995). On the other hand, mimesis is characterized in the literature as a highly rational, considered, or *mindful* approach to identifying alternatives that can help to improve firm performance (e.g., Gosain 2004; Greve 1998; Swanson and Ramiller 2004). Scholars making this characterization conclude that seeking advice to inform similar decisions as other, more successful firms can economize on costs of a broad market search for alternatives (Teo et al. 2003) and the risks of making a poor decision (Greve 1998). In contrast to such broad interpretations of mindfulness in the face of bandwagons, we seek to advance conceptual clarity by offering *empirical* evidence that mimetic behaviour can reflect a mindful or a less-mindful approach to strategic IT decisions depending on decision makers' *perceptual accuracy* regarding the value of IT.

An improved understanding of decision-makers' *perceptual accuracy* can, for example, improve our understanding of why innovations fail to generate performance advantages for many firms in an industry (Greve 2011). For example, prior literature has observed non-adoption behaviours of some firms in an industry and adjudges non-adopters as having a "status quo bias" (Polites and Karahanna 2012), an example of Type I error, which could be labelled "less mindful" toward the interests of the firm. However, Polites and Karahanna (2012) point out that the firm may have made a rational decision not to adopt the IT in question because they *perceive accurately* that the payoffs would not justify the costs in the context of their own firm, and not because they were biased toward the status quo. Consequently, we cannot accurately infer bias, Type I error, or mindfulness based merely on industry or network level observations of firms' behaviours. Accurate inference requires assessment of the *perceptual accuracy* of the strategic decision makers. Therefore, we join Greve (2011) and Polites and Karahanna (2012) in the call for more research into decision-makers' perceptions regarding the value of IT when making strategic IT decisions, and in particular how focal firm context influences decision-makers' perceptual accuracy. In support of that endeavour, our study advances a method for assessing CIOs' perceptual accuracy.

14.2 A Dynamic Capabilities view on Organizational Transformation

A third contribution concerns the conceptual clarity that the theoretical framework validated in this study can bring to the discourse on organizational transformation. A dichotomy has emerged in the discourse on organizational transformation between the evolutionary perspective and the punctuated equilibrium perspective (Besson and Rowe 2012). In contrast to treating the perspectives as competing views of organizational transformation, we seek to advance conceptual coherence by showing that *both* perspectives are contingently applicable, and the contextual conditions under which either perspective may be most applicable. In the evolutionary perspective, actors' practices are carried out against a background of rules and expectations, but the particular courses of action they choose are always, to some extent, improvisational (Orlikowski 1996; Weick and Roberts 1993). In the course of improvisation, actors interpret their actions, the actions taken by others, and the details of the situation in order to make sense of what they are doing, and there is always the possibility for actors to introduce variations in their actions. The degree of variation can range from minor adjustments to near total re-invention. By reinterpreting the background rules and expectations for actors, managers can direct the trajectory of incremental and on-going evolutionary change over time (Du and Flynn 2010). In the punctuated equilibrium perspective,

organizations that have succumbed to inertia, that introduce nil variation for long periods, are periodically broken out of that pattern by unforeseen exogenous forces, such as shocks, catastrophes, or crises, although the risk remains that the organization fails before a disrupting event occurs. Hence, the perspective of punctuated equilibrium has been cast as one extreme, characterized by deterministic exogenous effects and a passive role for management, whereas the evolutionary perspective has been cast as the other extreme, with its emphasis on small but on-going adaptations directed by rational managers. Both perspectives, however, share some common ground with respect to the exploration element of dynamic capabilities, which can bring conceptual clarity to both perspectives as follows.

Extant literature in the punctuated equilibrium perspective theorizes that the minimum condition for breaking out of inertia (i.e., thus creating the possibility for transformation) is the effective restoration of a choice situation – the insertion of at least one alternative course of action – that is superior to the current course of action (Sydow et al. 2009). Firms' manifest exploration capabilities, in particular seeking advice from higher-performing firms (an element of dynamic IT capabilities), can meet the minimum criteria for overcoming inertia. Exploration in the external advice network can help CIOs to distance themselves from the perceptual filtering routines that reinforce the existing mindset within their firms, which enables reflection on taken for granted practices with a more critical stance. Moreover, access to higher performing peers and the insights they gleaned from experience can expose CIOs to a different logic that interrupts the logic of the existing mindset. It is this challenge to the incumbent logic that triggers the possibility of overcoming inertia (Du and Flynn 2010; Lines et al. 2011). In this case, an organization would exhibit periods of nil change (inertia, prior to exploratory activity), interspersed with infrequent periods of radical change (associated with concerted exploratory activity), as predicted by punctuated equilibrium theory. Therefore, in firms that exhibit limited exploratory dynamic IT capabilities, where the configuration of IT governance is misaligned with the focal firm's state of technology enactment and fails to motivate CIOs to mindful advice seeking, the punctuated equilibrium perspective should provide the most applicable lens for examining organizational transformation.

Extant literature in the evolutionary perspective theorizes that managers can direct the trajectory of change by reinterpreting the background rules and expectations that actors draw upon as they improvise their actions (Du and Flynn 2010; Lines et al. 2011). Firms' manifest exploration capabilities, which expose CIOs to alternative ITs and strategic IT initiatives implemented in higher performing peer firms (an element of dynamic IT capabilities), can interrupt the logic of incumbent rules and expectations and, when communicated to users, trigger the possibility of

change in users' improvisational actions. In this case, on-going exploration in CIOs' advice networks can help organizations to remain viable by continually adapting in order to maintain alignment between IT and the functioning of the organization in relation to the environment (Bierly et al. 2009; Damanpour and Gopalakrishnan 2001; Wischnevsky and Damanpour 2006). Therefore, in firms that exhibit strong exploratory dynamic IT capabilities, where the configuration of IT governance is aligned with the focal firm's state of technology enactment and motivates CIOs to mindful advice seeking, evolutionary theory should provide the most applicable lens for examining organizational transformation. By showing the dynamic IT capabilities -contingent relationship between the evolutionary and punctuated equilibrium perspectives on organizational transformation we hope to contribute conceptual coherence to both perspectives.

14.3 On Coordinating Exploration in support of Dynamic IT Capabilities

A fourth contribution concerns questions that the empirical findings of this study raise for future research. In Part 2 of this thesis we have highlighted the importance of complementing exploitation activities (examined in Part 1 of this thesis) with exploration activities, which has long been considered a prerequisite for organizations to adapt to changing environmental conditions and thus a prerequisite for sustainable firm performance advantages (March 1991). However, attempts to balance simultaneous exploration and exploitation within an organization have proved problematic (Carlisle and McMillan 2006). On one hand, exploitation tends to drive out innovation in the pursuit of efficient routines. On the other hand, innovation as a result of exploration can disrupt efficient routines without manifesting any significant payoffs to offset the loss in existing business (He and Wong 2004). As we elaborate next, CIOs' advice networks constitute an especially salient form of organizational slack that enables management of exploration activities in complement to exploitation activities.

The solution to conducting both exploration and exploitation activities is to dedicate excess resources ("slack") to exploration activities. By dedicating excess resources to exploratory learning, efficient on-going operations are protected from disruptions and exploratory activities have the required freedom and flexibility to develop new capabilities (Carlisle and McMillan 2006). Three types of slack can serve this vital function: resource slack, control slack and conceptual slack (Schulman 1993). Resource slack is the redundancy of time, money and personnel that is withheld from commitment to on-going exploitation activities. Control slack implies individual degrees of freedom in organizational activity, some range of individual action unconstrained by formal structures of command and control.

Conceptual slack is a divergence in analytical perspectives among actors over theories, models, or causal assumptions pertaining to organizational technologies or production processes, which results when organizations remain exposed to multiple viewpoints and a broad range of emerging opportunities in the environment. The first two types, resource slack and control slack, have been depleting as extremely narrow performance margins have descended on organizations and their managers (Schulman 1993) and public demand has increased for tightly controlled, transparent and accountable operating decisions (Bart and Turel 2010; MMHA 2010). Hence, neither resource slack nor control slack is a plausible source of slack in support of exploration, and only conceptual slack seems plausible. Mindful search in external advice networks constitutes an important source of conceptual slack: vigilance toward constraints and affordances of emerging technologies and changing customer and regulatory demands. Therefore, in the local government context, mindful search in external advice networks may be the only plausible means of on-going exploration.

Nonetheless, our empirical data shows that such a flow of information between local governments is atypical. Because society depends on (and funds) local governments for public service delivery, it is in the best interests of society that local governments share information regarding more promising IT and strategic IT initiatives that can improve the costs of public service delivery. While our study elucidates organization-specific contingencies (i.e., IT governance), a promising question for future research emerges from our findings: *what role can external agencies, such as industry associations and/or higher tier governments, play in coordinating information flows between local governments that could improve sharing of information regarding more rewarding IT and strategic IT initiatives?* Post hoc analysis in our empirical context can provide some initial insight toward this future research question, as follows.

A large body of literature has examined alternative mechanisms for coordinating the flow of information: (1) markets, (2) authority-based (hierarchical control), and (3) social mechanisms (Dennis and Vessey 2005; Nickerson and Zenger 2004). Applying the lens of coordination mechanisms to our empirical context provides important insights as follows. Coordination of information flows in our context – advice seeking regarding more rewarding IT and strategic IT initiatives among local governments in Canada – meets the definition of *social mechanisms* because information sharing is volitional. This classification was supported in post-hoc interviews: when asked to characterize the context of advice sharing, the responses were exemplified in the words of one CIO who stated, "we respect each other, we know we can help each other out, so I can share something with municipality A, then when they work on something else they can provide that information to me; …sometimes you may not get information from municipality

A but from municipality G so collectively I am still benefiting." However, we also find empirical evidence of authority-based hierarchical control in some cases. Specifically, poor OSR helps to promote mindful advice seeking in firms in state 2 and state 3 of technology enactment (see Table 11.3). Poor OSR refers to an above-average dependency on higher tiers of government for funds in order to sustain local government operations. Increased dependency constitutes the basis for coercive power for higher-tier governments to make demands of the dependent lower-tier governments (i.e., hierarchical control) (Pfeffer and Salancik 2003). This notion too was supported in post-hoc interviews, where CIOs of firms that have poor OSR confirmed that funding from higher tier governments comes with coercive demands. Specifically, the higher tier governments impose specific performance requirements, frequent progress reports, and new business processes on local governments in exchange for receiving grants. We found that this hierarchical control is a causal attribute (i.e., poor OSR condition) that motivates mindful advice seeking in firms in state 2 and 3 of technology enactment. Therefore, both hierarchical and social mechanisms show merit in coordinating information flows between local governments. Furthermore, market actors such as technology vendors/consultants can participate in the inter-organizational discourse (Ko et al. 2005). However, there is a lack of clear guidance in the literature regarding best practices in coordinating information flows among all of the foregoing actors. For example, Brown and Duguid (1991) cast social versus hierarchical coordination as mutually exclusive, showing how socially coordinated information sharing breaks down when authority-based (hierarchical) coordination is imposed. Other scholars advocate for external agents that act as a catalyst to facilitate the emergence of clusters and networks (Phelps et al. 2007). Our findings (Table 11.3) suggest that no single coordination approach is most effective in promoting mindful external advice seeking in all cases: organizational context matters, in terms of firms' state of technology enactment. Therefore, future research is urgently required to elucidate external coordination configurations that are most effective in facilitating mindful external advice seeking, while considering organizational contexts (e.g., IT governance).

14.4 Next Steps

In the final chapter (15), we draw on the research and findings from Part 1 and Part 2 in order to propose a program of future research that integrates the disparate elements of dynamic IT capabilities that have been the subject of extensive empirical but independent research in their own right (Eisenhardt and Martin 2000). Because the elements comprising and shaping dynamic capabilities have messy, nonlinear, and discontinuous interactions, progress toward a holistic understanding of dynamic IT capabilities requires inquiring systems (theory basis

and accompanying methodologies) that can accommodate and capture this inherent complexity (El Sawy et al. 2010). We make specific recommendations to further advance such a holistic understanding of dynamic IT capabilities.

15.0 FUTURE RESEARCH

15.1 Toward an Integrated Theory of Dynamic IT Capabilities

Dynamic IT capabilities consist of identifiable and specific constructs that have often been the subject of extensive empirical research in their own right (Eisenhardt and Martin 2000). These constructs contribute independently to our understanding of dynamic IT capabilities as *firm's ability to (1) integrate, build, and reconfigure IT resources concurrently with (2) organizational business process and (3) managerial processes (4) in pursuit of performance advantages in a changing or uncertain environment* (Lim et al. 2011) as follows. First, research in the resource-based view of the organization shows that the flexibility/inflexibility of IT infrastructure resources is a key enabler/impediment of firm's ability to *integrate, build, and reconfigure IT-enabled resources*. Second, research in the practice perspective (e.g., Orlikowski 1996) finds that actors' understanding of why IT are used, knowing what IT functionalities are available, and being familiar with how to use these IT functionalities is a key enabler of (or in absence, impediment to) reconfiguring *organizational business processes* (e.g., Pavlou and El Sawy 2010; Wang et al. 2012). Third, research in strategic management emphasizes the *managerial processes* by which top managers strategically influence the occurrence and trajectory of change in patterns of IT use. In particular, firms tend to develop dynamic capabilities in the areas they emphasize in strategic plans (Wang et al. 2012), which serves as a frame of references for actors' routines use of IT (Du and Flynn 2010; Wolf et al. 2012). Fourth, firm performance qualifies the purposeful and systematic nature of dynamic capabilities as directed toward *aligning with a changing or uncertain environment* (e.g., Lim et al. 2011; Teece et al. 1997; Winter 2003), and recognizes the dynamic and situated nature of the context in which actors are embedded (e.g., Barreto 2010; Helfat et al. 2007). Although the foregoing constructs overlap, they capture different attributes of the dynamic capabilities phenomenon that the literature has not examined together (Helfat et al. 2007).

15.2 Interactions between Constructs

The lack of integration of the contributing literatures has resulted in conceptualizations of dynamic capabilities as a black box that is invisible, complex and tacit, difficult to observe, or causally ambiguous (Pavlou and El Sawy 2011). The problem with these conceptualizations is that they obfuscate the definition, empirical grounding and measurement of dynamic capabilities (Williamson 1999). Separate study of the constructs comprising dynamic IT

capabilities provides at best an incomplete understanding because the constructs comprising dynamic capabilities interact.

Prior research finds that the constructs of dynamic IT capabilities interact in non-linear ways across multiple levels of analysis. For example, from seemingly minor innovations at the user level (e.g., technological changes) can emerge dramatic impacts on a firm's financial performance (Salvato 2003). The presence of such non-linear (Kelloway 1998) and multilevel relationships (Hitt et al. 2007) violates core assumptions of popular variance-based analytical approaches such as linear regression and structural equation modelling (Kline 2011). Other interactions between levels of analysis are missing from the literature, such as how individual firms realize above-average performance in a market where the same resources (e.g., ITs) are widely diffused (Teece 2007). Because firms' resources in this case are not rare and inimitable, as required by RBV, significant differences in firm performance expose a gap in the understanding afforded by RBV regarding the link between firms' resources and relative performance advantages in the market. It is here that differences in firms' dynamic capabilities are thought to come into play. For example, significant differences in IT-enabled business value generation can be attributed to advanced (dynamic) capabilities to reconfigure IT and IT use to meet the demands imposed by market changes over time (Wolf et al. 2012). Organizations that exhibit enhanced dynamic capabilities can identify impending changes in the market earlier, and are able to derive highly contextualized IT innovation strategies that lead to above-average firm performance. This conceptualization of dynamic capabilities admits such a degree of complexity to organizational life that we cannot reduce the interplay of individual elements to the study of individual elements considered in isolation (Sage and Rouse 1999). Often constructs at different levels of analysis need to be analysed simultaneously. We believe, as others do (e.g., Benbya and McKelvey 2006; Nevo and Wade 2010; Sage and Rouse 1999), that adopting the foundation of complexity theory (with its complementary analytical techniques) is essential to advancing research into the complex dynamic phenomena of dynamic IT capabilities.

15.3 Complexity Theory

Complexity theory has as its core the biological metaphor that organisms do not merely change, they coevolve in time and over time with other organisms and with the constraints and affordances of their environment in a struggle to survive and thrive in that environment (Kauffman 1993; Merali 2006; Vidgen and Wang 2006). Coevolution proceeds as organisms mutually adapt by altering their behaviours and their interactions with other organisms, as organisms adapt to constraints and affordances of the environment, and as structures change and are

adapted by organisms, all in an effort to achieve "fitness", that is, to perform in a way that favours survival in that environment. Viewed through the lens of complexity theory, an organization is conceptualized as a complex adaptive system (CAS) composed of organisms (individual "agents", such as customer service specialists, managers) that, in time and over time, interact and mutually adapt with each other (defining a social structure or collective) and with other sociotechnical structures in an effort to achieve organizational goals and objectives. For example, Orlikowski (1996) observed that changing IT design and policy changed users' understanding of their jobs and how they appropriated IT design. It is from these complex and changing sociotechnical processes (Orlikowski and Iacono 2001; Orlikowski and Yates 2002) that organizational capabilities emerge (Benbya and McKelvey 2006; Nevo and Wade 2010).

On the basis of the foregoing research, we propose the use of complexity theory, with its conceptualization of firms as complex adaptive systems, in order to advance research into dynamic capabilities with IT. In a complex system, we cannot reduce the interplay of individual elements to the study of individual elements considered in isolation (Sage and Rouse 1999). Often, several different models of the complete system, each at a different level of abstraction, are needed. Specifically, we propose a conceptualization of dynamic capabilities as a continuous co-evolutionary 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 two levels of analysis in order to contribute to an organization's performance over time (Benbya and McKelvey 2006; Besson and Rowe 2012). These two levels of analysis are: (1) *strategic-organizational level* – coevolving IT and business strategies and domains; and (2) *individual-collective* level – coevolving IT infrastructure with users' needs (Benbya and McKelvey 2006). At the *strategic-organizational level*, IT governance mechanisms are directed towards a variety of IT-related issues concerning the manner by which critical IT decision processes are carried out, the policies put in place to guide these decision processes, and the assignment of accountabilities and participation rights regarding these decision processes (Huang et al. 2010). Top management is also responsible, as part of IT governance, for articulating IT strategy: the organizational perspective on investment in, deployment, use, and management of information systems (Chen et al. 2010). IT-enabled reconfiguration is also contingent upon shared understanding of domain knowledge and effective communication between business and IT executives, and the connection between IT and business planning (Reich and Benbasat 2000). The *individual-collective level* pertains to IT usage by the users to perform a task that is multilevel in its own right (Burton-Jones and Gallivan 2007). It also coevolves with the change in the users' needs and

enhanced functionality of IS over time. Elements at the strategic-operational and individual-collective level can improve to the extent that they coevolve over time. As such, a firm's *ability to (1) integrate, build, and reconfigure IT resources concurrently with (2) organizational business process and (3) managerial processes (4) in pursuit of performance advantages in a changing or uncertain environment* (i.e., dynamic IT capabilities) can exhibit both top-down and/or bottom-up effects depending on the nature of organizational perspectives that may change in response to the competitive environment (Chen et al. 2010). In order to analyse the complex interactions between the foregoing multi-level constructs, we propose increased adoption of computational modelling techniques in information systems research as follows.

15.4 Advanced Analytical Approaches

We recommend simulation as a formal computational modelling approach, which is increasingly used for theory development in the management, strategy and organization literatures (Carley 1999; Davis et al. 2007). In particular, agent-based simulation (ABS) can be appropriated in the quest to develop explanatory theory of the complex processes underlying change in IT use over time in organizations (e.g., Kane and Alavi 2007; March 1991; Nan 2011). Therefore, we call for research that exploits the capabilities of simulation to advance our understanding of dynamic capabilities. Simulation involves creating a computational representation of some underlying theoretical logic that links constructs together in order to model the operation of "real-world" systems (Davis et al. 2007). These representations are then encoded in software that is run repeatedly under varying experimental conditions in order to obtain data that can be statistically analyzed. ABS provides researchers four main advantages for analysing complex phenomena. First, because the elements of a theory are operationalized mathematically, an ABS model gives a clear and precise language for communicating insights and contributions (Harrison et al. 2007). Second, it provides general categories of assumptions so that insights and intuitions can be transferred from one context to another and can be crosschecked between different contexts in future empirical studies. Third, it affords the testing of particular insights and intuitions (e.g., our three stated research questions) in virtual experiments. Fourth, it helps researchers to trace back from 'observations' to underlying assumptions to see what assumptions are really at the heart of particular conclusions.

15.5 Concluding Remarks

In this thesis we sought to contribute conceptual coherence to the discourse on dynamic IT capabilities in three respects. First, we advanced a theoretical framework to tease apart the common versus idiosyncratic elements of firms' dynamic capabilities to exploit IT in practice. Our empirical findings can help to integrate conflicting conceptualizations of dynamic IT capabilities as common versus idiosyncratic. Second, we advanced a theoretical framework of firms' dynamic capabilities to explore for IT innovations that are likely to improve firm performance. To that end we examined CIOs' use of external advice networks to mindfully identify promising IT innovations. In so doing we clarified the concept (and advanced an operationalization) of mindfulness. Our positivist empirical study finds that mindfulness in CIO advice seeking is atypical. This finding is contrary to assumptions of IS literature in the technology diffusion and institutional perspectives. Our findings also elucidate the significance of IT governance in motivating mindful search for promising IT innovations. Third, through our chosen empirical research methodologies we sought to demonstrate the importance of qualitative and configurational approaches to investigate such complex phenomena as dynamic IT capabilities. We also advanced promising future research directions, theoretical grounding and analytical techniques that, by building on the concepts advanced in this study, can further advance our understanding of how firms acquire and realize dynamic IT capabilities in support of sustained performance advantages.

REFERENCES

Agarwal, R., and Sambamurthy, V. 2002. "Principles and models for organizing the IT function," *MIS Quarterly Executive* (1:1), pp 1-16.

Agarwal, R., and Selen, W. 2009. "Dynamic capability building in service value networks for achieving service innovation," *Decision Sciences* (40:3), pp 431-475.

Alaghehband, F. K., and Rivard, S. "The strategic role of information technology sourcing: a dynamic capabilities perspective," in: *Thirty First International Conference on Information Systems*, St. Louis, 2010.

Andersen, K. N., Medaglia, R., Vatrapu, R., Henriksen, H. Z., and Gauld, R. 2011. "The forgotten promise of e-government maturity: Assessing responsiveness in the digital public sector," *Government Information Quarterly* (28:4), pp 439-445.

Andersen, K. V., and Henriksen, H. Z. 2006. "E-government maturity models: Extension of the Layne and Lee model," *Government Information Quarterly* (23:2), pp 236-248.

Angst, C. M., Agarwal, R., Sambamurthy, V., and Kelley, K. 2010. "Social contagion and information technology diffusion: The adoption of electronic medical records in US hospitals," *Management Science* (56:8), pp 1219-1241.

Applegate, L. M., and Elam, J. J. 1992. "New information systems leaders: a changing role in a changing world," *MIS Quarterly* (16), pp 469-469.

Argyris, C. 1990. "Inappropriate defenses against the monitoring of organization development practice," *Journal of Applied Behavioral Science* (26:3), pp 299-312.

Armstrong, J., and Overton, T. 1977. "Estimating nonresponse bias in mail surveys," *Journal of Marketing Research* (14:1), pp 396-402.

Banker, R. D., Hu, N., Pavlou, P. A., and Luftman, J. 2011. "CIO reporting structure, strategic positioning, and firm performance," *MIS Quarterly* (35:2), pp 487-504.

Baptista, J., Newell, S., and Currie, W. 2010. "Paradoxical effects of institutionalisation on the strategic awareness of technology in organisations," *Journal of Strategic Information Systems* (19:3), pp 171-183.

Barreto, I. 2010. "Dynamic capabilities: A review of past research and an agenda for the future," *Journal of Management* (36:1), pp 256-280.

Bart, C., and Turel, O. 2010. "IT and the board of directors: An empirical investigation into the "governance questions" Canadian board members ask about IT," *Journal of Information Systems* (24:2), pp 147-172.

Beatty, R. P., and Zajac, E. J. 1994. "Managerial incentives, monitoring, and risk bearing: A study of executive compensation, ownership, and board structure in initial public offerings," *Administrative Science Quarterly* (39:2), pp 313-335.

Bekkers, V. 2007. "Modernization, public innovation and information and communication technologies: The emperor's new clothes?," *Information Polity* (12:3), pp 103-107.

Benbasat, I., Goldstein, D. K., and Mead, M. 1987. "The case research strategy in studies of information systems," *MIS Quarterly* (11:3), pp 369-386.

Benbya, H. H., and McKelvey, B. B. 2006. "Using coevolutionary and complexity theories to improve IS alignment: a multi-level approach," *Journal of Information Technology* (21:4), pp 284-298.

Bensaou, M., and Venkatraman, N. 1995. "Configurations of interorganizational relationships: a comparison between US and Japanese automakers," *Management Science* (41:9), pp 1471-1492.

Besson, P., and Rowe, F. 2012. "Strategizing information systems-enabled organizational transformation: A transdisciplinary review and new directions," *Journal of Strategic Information Systems* (21:2), pp 103-124.

Bierly, P. E., Damanpour, F., and Santoro, M. D. 2009. "The application of external knowledge: organizational conditions for exploration and exploitation," *Journal of Management Studies* (46:3), pp 481-509.

BMA, 2009. "Municipal Study – 2009", BMA Management Consulting Inc., Hamilton, ON.

Boudreau, M. C., and Robey, D. 2005. "Enacting integrated information technology: A human agency perspective," *Organization Science* (16:1), pp 3-18.

Brown, D. H., and Thompson, S. 2011. "Priorities, policies and practice of e-government in a developing country context: ICT infrastructure and diffusion in Jamaica," *European Journal of Information Systems* (20:3), pp 329-342.

Brown, J. S., and Duguid, P. 1991. "Organizational Learning and Communities-of-Practice: Toward a Unified View of Working, Learning, and Innovation," *Organization Science* (2:1, Special Issue: Organizational Learning: Papers in Honor of (and by) James G. March), pp 40-57.

Brynjolfsson, E., Hitt, L. M., and Yang, S. 2002. "Intangible assets: Computers and organizational capital," *Brookings Papers on Economic Activity* (2002:1), pp 137-198.

Burt, R. S. 1997. "The contingent value of social capital," *Administrative Science Quarterly* (42:2), pp 339-365.

Burton-Jones, A., and Gallivan, M. J. 2007. "Toward a deeper understanding of system usage in organizations: a multilevel perspective," *MIS Quarterly* (31:4), pp 657-679.

Capati-Caruso, A., and Valle, C., 2006. "E-Government Cost and Financing", The Knowledge Management Branch in the Division for Public Administration and Development Management, Department of Economic and Social Affairs, United Nations.

Carley, K. M. 1999. "On generating hypotheses using computer simulations," *Systems Engineering* (2:2), pp 69-77.

Carlisle, Y., and McMillan, E. 2006. "Innovation in organizations from a complex adaptive systems perspective," *Emergence: Complexity and Organization* (8:1), pp 2-9.

Carpenter, M. A., and Westphal, J. D. 2001. "The strategic context of external network ties: Examining the impact of director appointments on board involvement in strategic decision making," *Academy of Management Journal* (44:4), pp 639-660.

Cash, J. I., Earl, M. J., and Morison, R. 2008. "Teaming up to crack innovation and enterprise integration," *Harvard Business Review* (86:11), pp 90-100.

Chatterjee, D., Richardson, V. J., and Zmud, R. W. 2001. "Examining the shareholder wealth effects of announcements of newly created CIO positions," *MIS Quarterly* (25:1), pp 43-70.

Chen, D. Q., Preston, D. S., and Xia, W. 2010. "Antecedents and effects of CIO supply-side and demand-side leadership: A staged maturity model," *Journal of Management Information Systems* (27:1), pp 231-272.

Choi, J., and Wang, H. 2009. "Stakeholder relations and the persistence of corporate financial performance," *Strategic Management Journal* (30:8), pp 895-907.

Ciborra, C. U., Braa, K., Cordella, A., Dahlbom, B., Failla, A., Hanseth, O., Hepso, V., Ljungberg, J., and Monteiro, E., 2000. *From Control to Drift: the Dynamics of Corporate Information Infrastructures*. Oxford University Press, Oxford, UK.

Clemons, E. K., and Hann, I. H. 1999. "Rosenbluth international: strategic transformation of a successful enterprise," *Journal of Management Information Systems* (16:2), pp 9-27.

Clemons, E. K., and Row, M. C. 1992. "Information technology and industrial cooperation: the changing economics of coordination and ownership," *Journal of Management Information Systems* (9:2), pp 9-28.

Cohen, W. M., and Levinthal, D. A. 1990. "Absorptive capacity: a new perspective on learning and innovation," *Administrative Science Quarterly* (35:1), pp 128-152.

Cordella, A., and Iannacci, F. 2010. "Information systems in the public sector: The e-Government enactment framework," *Journal of Strategic Information Systems* (19:1), pp 52-66.

Cresswell, A. M., Canestraro, D., and Pardo, T. A., 2008. "A multi-dimensional approach to digital government capability assessment", Center for Technology in Government, pp. 1-14.

Crilly, D. 2010. "Predicting stakeholder orientation in the multinational enterprise: A mid-range theory," *Journal of International Business Studies* (42:5), pp 694-717.

Cross, R., and Sproull, L. 2004. "More than an answer: Information relationships for actionable knowledge," *Organization Science* (15:4), pp 446-462.

Cunha, M. P. e., and Chia, R. 2007. "Using teams to avoid peripheral blindness," *Long Range Planning* (40:6), pp 559-573.

Currie, W. L., and Guah, M. W. 2007. "Conflicting institutional logics: a national programme for IT in the organisational field of healthcare," *Journal of Information Technology* (22:3), pp 235-247.

Cyert, R. M., and March, J. G., 1963. *A behavioral theory of the firm*. M. E. Sharpe, Englewood Cliffs, NJ.

Daft, R. L., and Lengel, R. H. 1986. "Organizational information requirements, media richness and structural design," *Management Science* (32:5), pp 554-571.

Dahlberg, M., and Johansson, E. 1998. "The revenues-expenditures nexus: panel data evidence from Swedish municipalities," *Applied Economics* (30:10), pp 1379-1386.

Daily, C. M., Dalton, D. R., and Rajagopalan, N. 2003. "Governance through ownership: Centuries of practice, decades of research," *Academy of Management Journal* (46:2), pp 151-158.

Damanpour, F., and Gopalakrishnan, S. 2001. "The dynamics of the adoption of product and process innovations in organizations," *Journal of Management Studies* (38:1), pp 45-65.

Davenport, T. H., Harris, J. G., and Cantrell, S., 2002. "The Return of Enterprise Solutions: The Director's Cut", Accenture Institute for High Performance Business, Wellesley, MA.

Davidson, E. 2006. "A technological frames perspective on information technology and organizational change," *Journal of Applied Behavioral Science* (42:1), pp 23-39.

Davis, J. P., Eisenhardt, K. M., and Bingham, C. B. 2007. "Developing theory through simulation methods," *Academy of Management Review* (32:2), pp 480-499.

Dennis, A. R., and Vessey, I. 2005. "Three knowledge management strategies: Knowledge hierarchies, knowledge markets, and knowledge communities," *MIS Quarterly Executive* (4:4), pp 399-412.

Devadoss, P. R., Pan, S. L., and Huang, J. C. 2002. "Structurational analysis of e-government initiatives: a case study of SCO," *Decision Support Systems* (34:3), pp 253-269.

Dewan, S., and Kraemer, K. L. 2000. "Information technology and productivity: evidence from country-level data," *Management Science* (46:4), pp 548-562.

Dhillon, G. S., Weerakkody, V., and Dwivedi, Y. K. 2008. "Realising transformational stage e-government: a UK local authority perspective," *Electronic Government, An International Journal* (5:2), pp 162-180.

DiMaggio, P. J., and Powell, W. W. 1983. "The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields," *American Sociological Review* (48:2), pp 147-160.

Drnevich, P. L., and Kriauciunas, A. P. 2011. "Clarifying the conditions and limits of the contributions of ordinary and dynamic capabilities to relative firm performance," *Strategic Management Journal* (32:3), pp 254-279.

Du, Y., and Flynn, D. 2010. "Exploring the legitimation seeking activities in an information system project," International Conference on Information Systems.

Dubé, L., and Paré, G. 2003. "Rigor in information systems positivist case research: current practices, trends, and recommendations," *MIS Quarterly* (27:4), pp 597-636.

Dwivedi, Y. K., Weerakkody, V., and Janssen, M. 2011. "Moving towards maturity: challenges to successful e-government implementation and diffusion," *ACM SIGMIS Database* (42:4), pp 11-22.

Eisenhardt, K., and Tabrizi, B. N. 1995. "Accelerating adaptive processes: product innovation in the global computer industry," *Administrative Science Quarterly* (40:1), pp 84-110.

Eisenhardt, K. M. 1989a. "Agency theory: An assessment and review," *Academy of Management Review* (14:1), pp 57-74.

Eisenhardt, K. M. 1989b. "Making fast strategic decisions in high-velocity environments," *Academy of Management Journal* (32:3), pp 543-576.

Eisenhardt, K. M., and Martin, J. A. 2000. "Dynamic capabilities: what are they?," *Strategic Management Journal* (21:10/11), pp 1105-1121.

El Sawy, O. A., Malhotra, A., Park, Y. K., and Pavlou, P. A. 2010. "Research commentary—Seeking the configurations of digital ecodynamics: it takes three to tango," *Information Systems Research* (21:4), pp 835-848.

Faraj, S., and Xiao, Y. 2006. "Coordination in fast-response organizations," *Management Science* (52:8), pp 1155-1169.

Feeny, D. F., Edwards, B. R., and Simpson, K. M. 1992. "Understanding the CEO/CIO relationship," *MIS Quarterly* (16:4), pp 435-448.

Feldman, M. S., and Pentland, B. T. 2003. "Reconceptualizing organizational routines as a source of flexibility and change," *Administrative Science Quarterly* (48:1), pp 94-118.

Fey, C. F., and Furu, P. 2008. "Top management incentive compensation and knowledge sharing in multinational corporations," *Strategic Management Journal* (29:12), pp 1301-1323.

Fiol, C. M., and O'Connor, E. J. 2003. "Waking up! Mindfulness in the face of bandwagons," *Academy of Management Review* (28:1), pp 54-70.

Fiss, P. C. 2007. "A set-theoretic approach to organizational configurations," *Academy of Management Review* (32:4), pp 1180-1198.

Fiss, P. C. 2008. "Institutions and Corporate Governance," in *The SAGE Handbook of Organizational Institutionalism,* R. Greenwood, C. Oliver, K. Sahlin-Andersson and R. Suddaby (eds.), Sage Publications, pp. 389-410.

Fiss, P. C. 2011. "Building better causal theories: A fuzzy set approach to typologies in organization research," *Academy of Management Journal* (54:2), pp 393-420.

Foley, P., and Alfonso, X. 2009. "eGovernment and the transformation agenda," *Public Administration* (87:2), pp 371-396.

Ford, J. D., and Ford, L. W. 1994. "Logics of identity, contradiction, and attraction in change," *Academy of Management Review* (19:4), pp 756-785.

Fountain, J. E., 2001. *Building the Virtual State: Information Technology and Institutional Change*. Brookings Institution, Washington, DC.

George, E., Chattopadhyay, P., Sitkin, S. B., and Barden, J. 2006. "Cognitive underpinnings of institutional persistence and change: a framing perspective," *Academy of Management Review* (31:2), pp 347-365.

Gil-Garcia, J. R. 2006. "Enacting state websites: a mixed method study exploring e-government success in multi-organizational settings," Proceedings of the 39th Annual Hawaii International Conference on System Sciences, IEEE, pp. 1-10.

Gil-Garcia, J. R., Chengalur-Smith, I., and Duchessi, P. 2007. "Collaborative e-Government: impediments and benefits of information-sharing projects in the public sector," *European Journal of Information Systems* (16:2), pp 121-133.

Gladwell, M., 2000. *The tipping point: How little things can make a big difference*. Little, Brown and Company, Boston, MA.

Gosain, S. 2004. "Enterprise information systems as objects and carriers of institutional forces: the new iron cage?," *Journal of the Association for Information Systems* (5:4), pp 151-182.

Gottschalk, P., 2007. *CIO and corporate strategic management: Changing role of CIO to CEO*. IGI Global.

Grant, G., McKnight, S., Uruthirapathy, A., and Brown, A. 2007. "Designing governance for shared services organizations in the public service," *Government Information Quarterly* (24:3), pp 522-538.

Greenwood, R., and Hinings, C. R. 1996. "Understanding radical organizational change: Bringing together the old and the new institutionalism," *Academy of Management Review* (21:4), pp 1022-1054.

Greve, H. R. 1998. "Managerial cognition and the mimetic adoption of market positions: What you see is what you do," *Strategic Management Journal* (19:10), pp 967-988.

Greve, H. R. 2011. "Fast and expensive: the diffusion of a disappointing innovation," *Strategic Management Journal* (32:9), pp 949-968.

Grover, V., Jeong, S. R., Kettinger, W. J., and Lee, C. C. 1993. "The chief information officer: A study of managerial roles," *Journal of Management Information Systems* (10:2), pp 107-130.

Gu, B., Xue, L., and Ray, G. 2008. "IT Governance and IT investment Performance: an empirical analysis," International Conference on Information Systems 2008 Proceedings, AIS.

Guba, E. G., and Lincoln, Y. S., 1989. *Fourth Generation Evaluation*. Sage Publications, Newbury Park, CA.

Guillemette, M. G., and Paré, G. 2012. "Toward a new theory of the contribution of the IT function in organizations," *MIS Quarterly* (36:2), pp 529-551.

Hansen, A. M., Kraemmergaard, P., and Mathiassen, L. 2011. "Rapid adaptation in digital transformation: a participatory process for engaging IS and business leaders," *MIS Quarterly Executive* (10:4), pp 175-185.

Harrison, J. R., Carroll, G. R., and Carley, K. M. 2007. "Simulation modeling in organizational and management research," *Academy of Management Review* (32:4), pp 1229-1245.

Hart, W., Albarracín, D., Eagly, A. H., Brechan, I., Lindberg, M. J., and Merrill, L. 2009. "Feeling validated versus being correct: a meta-analysis of selective exposure to information," *Psychological Bulletin* (135:4), pp 555–588.

Haunschild, P. R., and Miner, A. S. 1997. "Modes of interorganizational imitation: The effects of outcome salience and uncertainty," *Administrative Science Quarterly* (42:3), pp 472-500.

He, Z. L., and Wong, P. K. 2004. "Exploration vs. exploitation: An empirical test of the ambidexterity hypothesis," *Organization Science* (15:4), pp 481-494.

Heeks, R., and Stanforth, C. 2007. "Understanding e-Government project trajectories from an actor-network perspective," *European Journal of Information Systems* (16:2), pp 165-177.

Helfat, C. E., Finkelstein, S., Mitchell, W., Peteraf, M. A., Singh, H., Teece, D. J., and Winter, S. G., 2007. *Dynamic Capabilities: Understanding Strategic Change In Organizations*. Blackwell Pub.

Henderson, J. C., and Venkatraman, N. 1993. "Strategic alignment: Leveraging information technology for transforming organizations," *IBM Systems Journal* (32:1), pp 4-16.

Heracleous, L., and Barrett, M. 2001. "Organizational change as discourse: Communicative actions and deep structures in the context of information technology implementation," *Academy of Management Journal* (44:4), pp 755-778.

Hitt, M. A., Beamish, P. W., Jackson, S. E., and Mathieu, J. E. 2007. "Building theoretical and empirical bridges across levels: Multilevel research in management," *Academy of Management Journal* (50:6), pp 1385-1399.

Hjort-Madsen, K. 2007. "Institutional patterns of enterprise architecture adoption in government," *Transforming Government: People, Process and Policy* (1:4), pp 333-349.

Holden, S. H., Norris, D. F., and Fletcher, P. D. 2003. "Electronic government at the local level: Progress to date and future issues," *Public Performance & Management Review* (26:4), pp 325-344.

Hossain, M. D., Moon, J., Kim, J. K., and Choe, Y. C. 2011. "Impacts of organizational assimilation of e-government systems on business value creation: A structuration theory approach," *Electronic Commerce Research and Applications* (10:5), pp 576-594.

Huang, R., Zmud, R. W., and Price, R. L. 2010. "Influencing the effectiveness of IT governance practices through steering committees and communication policies," *European Journal of Information Systems* (19:3), pp 288-302.

Huang, S., and Tilley, S. 2003. "Towards a documentation maturity model," Proceedings of the 21st annual International Conference on Documentation, ACM, pp. 93-99.

Huang, Z. 2007. "A comprehensive analysis of U.S. counties' e-Government portals: development status and functionalities," *European Journal of Information Systems* (16:2), pp 149-164.

Huberman, M., and Miles, M. B., 2002. *The Qualitative Researcher's Companion*. Sage Publications, Thousand Oaks, CA.

Irani, Z., Love, P. E. D., Elliman, T., Jones, S., and Themistocleous, M. 2005. "Evaluating e-government: learning from the experiences of two UK local authorities," *Information Systems Journal* (15:1), pp 61-82.

Irani, Z., Love, P. E. D., and Jones, S. 2008. "Learning lessons from evaluating eGovernment: Reflective case experiences that support transformational government," *Journal of Strategic Information Systems* (17:2), pp 155-164.

Irani, Z., Love, P. E. D., and Montazemi, A. 2007. "e-Government: past, present and future," *European Journal of Information Systems* (16:2), pp 103-105.

ITGI IT Governance Institute, 2008. "Enterprise Value: Governance of IT Investments-The Val IT Framework 2.0", ISACA, Rolling Meadows, IL.

ITGIOGC, 2005. "Aligning COBIT®, ITIL® and ISO 17799 for Business Benefit: Management Summary", IT Governance Institute and the Office of Government Commerce, Rolling Meadows, IL.

Jaklič, J., and Štemberger, M. I. 2009. "Towards t-government by increasing process maturity in public sector," in *Handbook of Research on ICT-Enabled Transformational Government: A Global Perspective,* V. Weerakkody, M. Janssen and Y.K. Dwivedi (eds.), pp. 15-34.

Jansen, J., de Vries, S., and van Schaik, P. 2010. "The contextual benchmark method: Benchmarking e-government services," *Government Information Quarterly* (27:3), pp 213-219.

Jansen, K. J. 2004. "From persistence to pursuit: A longitudinal examination of momentum during the early stages of strategic change," *Organization Science* (15:3), pp 276-294.

Janssen, M., and Hjort-Madsen, K. 2007. "Analyzing enterprise architecture in national governments: The cases of Denmark and the Netherlands," System Sciences, 2007. HICSS 2007. 40th Annual Hawaii International Conference on, IEEE, pp. 218a-218a.

Janssen, M., Kuk, G., and Wagenaar, R. W. 2008. "A survey of web-based business models for e-government in the Netherlands," *Government Information Quarterly* (25:2), pp 202-220.

Janssen, M., and Van Veenstra, A. F. 2005. "Stages of growth in e-government: An architectural approach," *Electronic Journal of e-Government* (3:4), pp 193-200.

Jensen, M. C., and Murphy, K. J. 1990. "Performance pay and top-management incentives," *Journal of Political Economy* (98:2), pp 225-264.

Jun, K. N., and Weare, C. 2011. "Institutional motivations in the adoption of innovations: The case of e-government," *Journal of Public Administration Research and Theory* (21:3), pp 495-519.

Kane, G. C., and Alavi, M. 2007. "Information technology and organizational learning: An investigation of exploration and exploitation processes," *Organization Science* (18:5), pp 796-812.

Kassahun, A. E., Molla, A., and Sarkar, P. 2011. "Government process reengineering: What we know and what we need to know," in *Strategic Enterprise Resource Planning Models for E-Government: Applications and Methodologies,* S. Chhabra and M. Kumar (eds.), Information Science Reference, pp. 1-24.

Kauffman, S. A., 1993. *The Origins of Order: Self-Organization and Selection in Evolution*. Oxford University Press, USA.

Ke, W., and Wei, K. K. 2004. "Successful e-government in Singapore," *Communications of the ACM* (47:6), pp 95-99.

Kearns, G., and Sabherwal, R. 2007. "Strategic alignment between business and information technology: A knowledge-based view of behaviors, outcome, and consequences," *Journal of Management Information Systems* (23:3), pp 129-162.

Kelloway, E. K., 1998. *Using LISREL for structural equation modeling: A researcher's guide*. Sage Publications.

Kim, G., Shin, B., Kim, K. K., and Lee, H. G. 2011. "IT capabilities, process-oriented dynamic capabilities, and firm financial performance," *Journal of the Association for Information Systems* (12:7), pp 487-517.

Kline, R. B., 2011. *Principles and Practice of Structural Equation Modeling (3rd Ed.)*. Guilford Press, New York, NY.

Ko, D.-G., Kirsch, L. J., and King, W. R. 2005. "Antecedents of knowledge transfer from consultants to clients in enterprise system implementations," *MIS Quarterly* (29:1), pp 59-85.

Kohli, R., and Devaraj, S. 2003. "Measuring Information Technology Payoff: A Meta-Analysis of Structural Variables in Firm-Level Empirical Research," *Information Systems Research* (14:2), pp 127-145.

Kumar, M., and Sareen, M. 2011. "Evaluating web sites of municipal corporations: A case study of leading cities in India," in *Strategic*

Enterprise Resource Planning Models for E-Government: Applications and Methodologies, S. Chhabra and M. Kumar (eds.), pp. 143-157.

Landis, J. R., and Koch, G. G. 1977. "The measurement of observer agreement for categorical data," *Biometrics* (33:1), pp 159-174.

Layne, K., and Lee, J. 2001. "Developing fully functional e-government: A four stage model," *Government Information Quarterly* (18:2), pp 122-136.

Lee, A. S. 1991. "Integrating positivist and interpretive approaches to organizational research," *Organization Science* (2:4), pp 342-365.

Lee, H. L., Padmanabhan, V., and Whang, S. 2004. "Information Distortion in a Supply Chain: The Bullwhip Effect," *Management Science* (50), pp 1875-1886.

Lee, J. 2010. "10 year retrospect on stage models of e-Government: A qualitative meta-synthesis," *Government Information Quarterly* (27:3), pp 220-230.

Leonard-Barton, D. 2007. "Core capabilities and core rigidities: A paradox in managing new product development," *Strategic Management Journal* (13:Special Issue), pp 111-125.

Levie, J., and Hay, M., 1998. "Progress or just proliferation? A historical review of stages models of early corporate growth", Working Papers, London Business School, London.

Levinthal, D., and Rerup, C. 2006. "Crossing an apparent chasm: Bridging mindful and less-mindful perspectives on organizational learning," *Organization Science* (17:4), pp 502-513.

Lewin, A. Y., Massini, S., and Peeters, C. 2011. "Microfoundations of internal and external absorptive capacity routines," *Organization Science* (22:1), pp 81-98.

Lewin, A. Y., and Volberda, H. W. 1999. "Prolegomena on coevolution: A framework for research on strategy and new organizational forms," *Organization Science* (10:5), pp 519-534.

Li, X. 2009. "Managerial entrenchment with strategic information technology: A dynamic perspective," *Journal of Management Information Systems* (25:4), pp 183-204.

Liang, H., Saraf, N., Hu, Q., and Xue, Y. 2007. "Assimilation of enterprise systems: the effect of institutional pressures and the mediating role of top management," *MIS Quarterly* (31:1), pp 59-87.

Lim, J. H., Stratopoulos, T. C., and Wirjanto, T. S. 2011. "Path dependence of dynamic information technology capability: an empirical investigation," *Journal of Management Information Systems* (28:3), pp 45-84.

Lin, L., Geng, X., and Whinston, A. B. 2005. "A sender-receiver framework for knowledge transfer," *MIS Quarterly* (29:2), pp 197-219.

Lines, R., Sáenz, J., and Aramburu, N. 2011. "Organizational Learning As a By-product of Justifications for Change," *Journal of Change Management* (11:2), pp 163-184.

Lockamy III, A., and McCormack, K. 2004. "The development of a supply chain management process maturity model using the concepts of business process orientation," *Supply Chain Management: An International Journal* (9:4), pp 272-278.

Lounsbury, M. 2008. "Institutional rationality and practice variation: New directions in the institutional analysis of practice," *Accounting, Organizations and Society* (33:4), pp 349-361.

Lu, Y., and Ramamurthy, K. 2011. "Understanding the link between information technology capability and organizational agility: An empirical examination," *MIS Quarterly* (35:4), pp 931-954.

Luna-Reyes, L. F., Gil-Garcia, J. R., and Cruz, C. B. 2007. "Collaborative digital government in Mexico: Some lessons from federal web-based interorganizational information integration initiatives," *Government Information Quarterly* (24:4), pp 808-826.

Luna-Reyes, L. F., Gil-Garcia, J. R., and Romero, G. 2012. "Towards a multidimensional model for evaluating electronic government: Proposing a more comprehensive and integrative perspective," *Government Information Quarterly* (29:1), pp 324–334.

Luna-Reyes, L. F., Zhang, J., Gil-García, J. R., and Cresswell, A. M. 2005. "Information systems development as emergent socio-technical change: a practice approach," *European Journal of Information Systems* (14:1), pp 93-105.

Lyytinen, K., Newman, M., and Al-Muharfi, A. R. A. 2009. "Institutionalizing enterprise resource planning in the Saudi steel industry: A punctuated socio-technical analysis," *Journal of Information Technology* (24:4), pp 286-304.

Lyytinen, K., and Rose, G. M. 2006. "Information system development agility as organizational learning," *European Journal of Information Systems* (15:2), pp 183-199.

Maniatopoulos, G. 2005. "E-government movements of organizational change: A social shaping approach," The 4th International Critical Management Studies Conference, Critique and Inclusivity: Opening the Agenda.

March, J. G. 1991. "Exploration and exploitation in organizational learning," *Organization Science* (2:1), pp 71-87.

Marx, A. "Towards more robust model specification in QCA: Results from a methodological experiment," in: *COMPASSS – Working Paper*, 2006.

Mata, F. J., Fuerst, W. L., and Barney, J. B. 1995. "Information technology and sustained competitive advantage: A resource-based analysis," *MIS Quarterly* (19:4), pp 487-505.

McAdam, R., and Mitchell, N. 1998. "Development of a business process re-engineering model applicable to the public sector," *Total Quality Management* (9:4-5), pp 160-163.

McDonald, M. L., Khanna, P., and Westphal, J. D. 2008. "Getting them to think outside the circle: Corporate governance, CEOs' external advice networks, and firm performance," *Academy of Management Journal* (51:3), pp 453-475.

McDonald, M. L., and Westphal, J. D. 2003. "Getting by with the advice of their friends: CEOs' advice networks and firms' strategic responses to poor performance," *Administrative Science Quarterly* (48:1), pp 1-32.

McEvily, B., and Zaheer, A. 1999. "Bridging ties: A source of firm heterogeneity in competitive capabilities," *Strategic Management Journal* (20:12), pp 1133-1156.

Melville, N., Kraemer, K., and Gurbaxani, V. 2004. "Review: Information technology and organizational performance: An integrative model of IT business value," *MIS Quarterly* (28:2), pp 283-322.

Merali, Y. 2006. "Complexity and information systems: the emergent domain," *Journal of Information Technology* (21:4), pp 216-228.

Meyer, A. D., Tsui, A. S., and Hinings, C. R. 1993. "Configurational approaches to organizational analysis," *Academy of Management Journal* (36:6), pp 1175-1195.

Mignerat, M., and Rivard, S. 2009. "Positioning the institutional perspective in information systems research," *Journal of Information Technology* (24:4), pp 369-391.

Miles, M. B., and Huberman, A., 1984. *Qualitative Data Analysis: A Sourcebook of New Methods*. Sage Publications, Beverly Hills, CA.

Miller, D. 1987. "The genesis of configuration," *Academy of Management Review* (12:4), pp 686-701.

Miller, D. 1990. "Organizational configurations: Cohesion, change, and prediction," *Human Relations* (43:8), pp 771-789.

Miller, D., and Friesen, P. H. 1984. "A longitudinal study of the corporate life cycle," *Management Science* (30:10), pp 1161-1183.

Mimicopoulos, M. G., 2004. "E-government funding activities and strategies", United Nations, Department of Economic and Social Affairs, Division for Public Administration and Development Management, New York, NY.

Minbaeva, D., and Pedersen, T. 2003. "MNC knowledge transfer, subsidiary absorptive capacity, and HRM," *Journal of International Business Studies* (34), pp 586-599.

Miranda, S. M., and Saunders, C. S. 2003. "The social construction of meaning: An alternative perspective on information sharing," *Information Systems Research* (14:1), pp 87-106.

MMHA, 2010. "Municipal Performance Measurement Program, Summary of 2008 Results", Ministry of Municipal Affairs and Housing, Ontario.

Montazemi, A. R., Pittaway, J. J., Qahri Saremi, H., and Wei, Y. 2012. "Factors of stickiness in transfers of know-how between MNC units," *Journal of Strategic Information Systems* (21:1), pp 31-57.

Moon, M. J. 2002. "The evolution of e-government among municipalities: rhetoric or reality?," *Public Administration Review* (62:4), pp 424-433.

Munro, G. D., and Stansbury, J. A. 2009. "The dark side of self-affirmation: Confirmation bias and illusory correlation in response to threatening information," *Personality and Social Psychology Bulletin* (35:9), pp 1143-1153.

Nan, N. 2011. "Capturing bottom-up information technology use processes: a complex adaptive systems model," *MIS Quarterly* (35:2), pp 505-532.

Nebus, J. 2006. "Building collegial information networks: A theory of advice network generation," *Academy of Management Review* (31:3), pp 615-637.

Nevo, S., and Wade, M. R. 2010. "The formation and value of IT-enabled resources: Antecedents and consequences of synergistic relationships," *MIS Quarterly* (34:1), pp 163-183.

Nickerson, J. A., and Zenger, T. R. 2004. "A knowledge-based theory of the firm-the problem-solving perspective," *Organization Science* (15:6), pp 617–632.

Nour, M. A., AbdelRahman, A. R. A., and Fadlalla, A. 2008. "A context-based integrative framework for e-government initiatives," *Government Information Quarterly* (25:3), pp 448-461.

Oliver, C. 1991. "Strategic responses to institutional processes," *Academy of Management Review* (16:1), pp 145-179.

Ongaro, E. 2004. "Process management in the public sector: the experience of one-stop shops in Italy," *International Journal of Public Sector Management* (17:1), pp 81-107.

Orlikowski, W., and Robey, D. 1991. "Information technology and the structuring of organizations," *Information Systems Research* (2:2), pp 143-169.

Orlikowski, W. J. 1996. "Improvising organizational transformation over time: a situated change perspective," *Information Systems Research* (7:1), pp 63-92.

Orlikowski, W. J., and Iacono, C. S. 2001. "Research commentary: Desperately seeking the 'IT' in IT research—a call to theorizing the IT artifact," *Information Systems Research* (12:2), pp 121-134.

Orlikowski, W. J., and Yates, J. A. 2002. "It's about time: Temporal structuring in organizations," *Organization Science* (13:6), pp 684-700.

Osterloh, M., and Frey, B. S. 2000. "Motivation, knowledge transfer, and organizational forms," *Organization Science* (11:5), pp 538-550.

Pärna, O., and von Tunzelmann, N. 2007. "Innovation in the public sector: Key features influencing the development and implementation of technologically innovative public sector services in the UK, Denmark, Finland and Estonia," *Information Polity* (12:3), pp 109-125.

Pavlou, P. A., and El Sawy, O. A. 2010. "The 'third hand': IT-enabled competitive advantage in turbulence through improvisational capabilities," *Information Systems Research* (21:3), pp 443-471.

Pavlou, P. A., and El Sawy, O. A. 2011. "Understanding the elusive black box of dynamic capabilities," *Decision Sciences* (42:1), pp 239-273.

Peppard, J., and Breu, K. 2003. "Beyond alignment: a coevolutionary view of the information systems strategy process," International Conference on Information Systems.

Peppard, J., and Ward, J. 1999. "'Mind the Gap': diagnosing the relationship between the IT organisation and the rest of the business," *Journal of Strategic Information Systems* (8:1), pp 29-60.

Petty, R. E., and Wegener, D. T. 1999. "The elaboration likelihood model: Current status and controversies," in *Dual-Process Theories in Social Psychology,* S. Chaiken and Y. Trope (eds.), Guilford Press, New York, NY, pp. 37-72.

Pfeffer, J., and Salancik, G., 2003. *The External Control of Organizations: A Resource Dependence Perspective*. Stanford Business Books.

Phelps, R., Adams, R., and Bessant, J. 2007. "Life cycles of growing organizations: A review with implications for knowledge and learning," *International Journal of Management Reviews* (9:1), pp 1-30.

Plambeck, N., and Weber, K. 2009. "When the glass is half full and half empty: CEOs' ambivalent interpretations of strategic issues," *Strategic Management Journal* (31:7), pp 689-710.

Polites, G. L., and Karahanna, E. 2012. "Shackled to the status quo: the inhibiting effects of incumbent system habit, switching costs, and inertia on new system acceptance," *MIS Quarterly* (36:1), pp 21-42.

Premkumar, G., Ramamurthy, K., and Saunders, C. S. 2003. "Information processing view of organizations: an exploratory examination of fit in the context of interorganizational relationships," *Journal of Management Information Systems* (22:1), pp 257-294.

Preston, D. S., and Karahanna, E. 2009. "Antecedents of IS strategic alignment: a nomological network," *Information Systems Research* (20:2), pp 159-179.

Preston, D. S., Leidner, D. E., and Chen, D. 2008. "CIO leadership profiles: implications of matching CIO authority and leadership capability on IT impact," *MIS Quarterly Executive* (7:2), pp 57-69.

Priem, R. L., and Butler, J. E. 2001. "Is the resource-based 'view' a useful perspective for strategic management research," *Academy of Management Review* (26:1), pp 22-40.

Ragin, C. C. 2006. "Set relations in social research: Evaluating their consistency and coverage," *Political Analysis* (14:3), pp 291-310.

Ragin, C. C., 2008. *Redesigning Social Inquiry: Fuzzy Sets and Beyond*. University of Chicago Press.

Ragin, C. C., Drass, K. A., and Davey, S., 2006. "Fuzzy-Set/Qualitative Comparative Analysis 2.0", Department of Sociology, University of Arizona, Tucson, Arizona.

Ragin, C. C., and Giesel, H. M., 2008. *User's guide to fuzzy-set/qualitative comparative analysis*. University of Arizona.

Ranganathan, C., and Brown, C. V. 2006. "ERP investments and the market value of firms: Toward an understanding of influential ERP project variables," *Information Systems Research* (17:2), pp 145-161.

Reddick, C. G. 2004. "A two-stage model of e-government growth: Theories and empirical evidence for US cities," *Government Information Quarterly* (21:1), pp 51-64.

Reich, B. H., and Benbasat, I. 2000. "Factors that influence the social dimension of alignment between business and information technology objectives," *MIS Quarterly* (24:1), pp 81-113.

Rogers, E., 2003. *The Diffusion of Innovations. Fifth Edition*. The Free Press, New York.

Ross, J. W., and Feeny, D. F., 2003. "The evolving role of the CIO", Sloan School of Management Working papers, Massachusetts Institute of Technology.

Ross, J. W., Weill, P., and Robertson, D., 2006. *Enterprise Architecture as Strategy: Creating a Foundation for Business Execution*. Harvard Business School Press, Boston, MA.

Sabherwal, R., and Chan, Y. E. 2001. "Alignment between business and IS strategies: a study of Prospectors, Analyzers, and Defenders," *Information Systems Research* (12:1), pp 11-33.

Sackmann, S. 1989. "The role of metaphors in organization transformation," *Human Relations* (42:6), pp 463-485.

Sage, A. P., and Rouse, W. B. 1999. "Information systems frontiers in knowledge management," *Information Systems Frontiers* (1:3), pp 205-219.

Salvato, C. 2003. "The role of micro-strategies in the engineering of firm evolution," *Journal of Management Studies* (40:1), pp 83-108.

Sambamurthy, V., and Zmud, R. W. 1999. "Arrangements for information technology governance: a theory of multiple contingencies," *MIS Quarterly* (23:2), pp 261-290.

Schulman, P. R. 1993. "The negotiated order of organizational reliability," *Administration & Society* (25:3), pp 353-372.

Schutz, A. 1954. "Concept and theory formation in the social sciences," *Journal of Philosophy* (51:9), pp 257-273.

Scott, W. R., Ruef, M., Mendel, P. J., and Caronna, C. A., 2000. *Institutional Change and Healthcare Organizations: From Professional Dominance to Managed Care*. University of Chicago Press.

Segars, A. H., Grover, V., and Teng, J. T. C. 1998. "Strategic information systems planning: planning system dimensions, internal coalignment, and implications for planning effectiveness," *Decision Sciences* (29:2), pp 303(344)-347.

SEI Software Engineering Institute, 2006. "CMMI for Development, version 1.2", Carnegie Mellon University, Pittsburgh, PA.

Seo, M. G., and Creed, W. E. D. 2002. "Institutional contradictions, praxis, and institutional change: A dialectical perspective," *Academy of Management Review* (27:2), pp 222-247.

Siau, K., and Long, Y. 2005. "Synthesizing e-government stage models–a meta-synthesis based on meta-ethnography approach," *Industrial Management & Data Systems* (105:4), pp 443-458.

Singh, H., Das, A., and Joseph, D. 2007. "Country-level determinants of e-Government maturity," *Communications of the Association for Information Systems* (20:1), pp 632-648.

Smaltz, D. H., Sambamurthy, V., and Agarwal, R. 2006. "The antecedents of CIO role effectiveness in organizations: An empirical study in the healthcare sector," *Engineering Management, IEEE Transactions on* (53:2), pp 207-222.

Soh, C., and Markus, M. L. 1995. "How IT creates business value: a process theory synthesis," International Conference on Information Systems, pp. 29-42.

Son, J. Y., and Benbasat, I. 2007. "Organizational buyers' adoption and use of B2B electronic marketplaces: efficiency-and legitimacy-oriented perspectives," *Journal of Management Information Systems* (24:1), pp 55-99.

Stephens, C. S., Ledbetter, W. N., Mitra, A., and Ford, F. N. 1992. "Executive or functional manager? The nature of the CIO's job," *MIS Quarterly* (16:4), pp 449-467.

Strejcek, G., and Theil, M. 2002. "Technology push, legislation pull? E-government in the European Union," *Decision Support Systems* (34:3), pp 305-313.

Suchman, M. C. 1995. "Managing legitimacy: Strategic and institutional approaches," *Academy of Management Review* (20:3), pp 571-610.

Swanson, E. B., and Ramiller, N. C. 1997. "The organizing vision in information systems innovation," *Organization Science* (8:5), pp 458-474.

Swanson, E. B., and Ramiller, N. C. 2004. "Innovating mindfully with information technology," *MIS Quarterly* (28:4), pp 553-583.

Sydow, J., Schreyögg, G., and Koch, J. 2009. "Organizational path dependence: Opening the black box," *Academy of Management Review* (34:4), pp 689-709.

Tallon, P. P. 2010. "A Service Science Perspective on Strategic Choice, IT, and Performance in US Banking," *Journal of Management Information Systems* (26:4), pp 219-252.

Tallon, P. P., and Kraemer, K. L. 2007. "Fact or fiction? A sensemaking perspective on the reality behind executives' perceptions of IT business value," *Journal of Management Information Systems* (24:1), pp 13-54.

Tallon, P. P., and Pinsonneault, A. 2011. "Competing perspectives on the link between strategic information technology alignment and organizational agility: insights from a mediation model," *MIS Quarterly* (35:2), pp 463-484.

Teece, D. J. 2007. "Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance," *Strategic Management Journal* (28:13), pp 1319-1350.

Teece, D. J., Pisano, G., and Shuen, A. 1997. "Dynamic capabilities and strategic management," *Strategic Management Journal* (18:7), pp 509-533.

Teo, H. H., Wei, K. K., and Benbasat, I. 2003. "Predicting intention to adopt interorganizational linkages: An institutional perspective," *MIS Quarterly* (27:1), pp 19-49.

Teo, T. S. H., Srivastava, S. C., Ranganathan, C., and Loo, J. W. K. 2011. "A framework for stakeholder oriented mindfulness: case of RFID implementation at YCH Group, Singapore," *European Journal of Information Systems* (20:2), pp 201-220.

Tiwana, A., and Konsynski, B. 2010. "Complementarities between organizational IT architecture and governance structure," *Information Systems Research* (21:2), pp 288-304.

Tolbert, P. S., and Zucker, L. G. 1983. "Institutional sources of change in the formal structure of organizations: The diffusion of civil service reform, 1880-1935," *Administrative Science Quarterly* (28:1), pp 22-39.

Torkzadeh, G., and Xia, W. 1992. "Managing telecommunications by steering committee," *MIS Quarterly* (16:2), pp 187-199.

Tsai, N., Choi, B., and Perry, M. 2009. "Improving the process of e-government initiative: An in-depth case study of web-based GIS implementation," *Government Information Quarterly* (26:2), pp 368-376.

United Nations, 2010. "UN E-Government Survey 2010: UN E-Government development index 2010", New York, NY.

United Nations "United Nations E-Government Survey 2012," United Nations Department of Economic and Social Affairs, New York, 2012.

Valdés, G., Solar, M., Astudillo, H., Iribarren, M., Concha, G., and Visconti, M. 2011. "Conception, development and implementation of an e-Government maturity model in public agencies," *Government Information Quarterly* (28:2), pp 176-187.

Vidgen, R., and Wang, X. 2006. "From business process management to business process ecosystem," *Journal of Information Technology* (21:4), pp 262-271.

Vyakarnam, S., Stockley, S., and Kershaw, W. 2000. "Snakes and Ladders: a growth model of management in rapidly growing businesses," Frontiers of entrepreneurship research, Babson-Kauffman Entrepreneurship Research Conference.

Wang, N., Liang, H., Zhong, W., Xue, Y., and Xiao, J. 2012. "Resource structuring or capability building? An empirical study of the business value of information technology," *Journal of Management Information Systems* (29:2), pp 325-367.

Weerakkody, V., Dhillon, G., Dwivedi, Y., and Currie, W. 2008. "Realising transformational stage e-government: challenges, issues and complexities," AMCIS 2008 Proceedings, Association for Information Systems, pp. 1-17.

Weick, K. E., and Roberts, K. H. 1993. "Collective mind in organizations: Heedful interrelating on flight decks," *Administrative Science Quarterly* (38:3), pp 357-381.

Weick, K. E., and Sutcliffe, K. M. 2006. "Mindfulness and the quality of organizational attention," *Organization Science* (17:4), pp 514-524.

Weill, P., and Ross, J. W., 2004. *IT governance: How top performers manage IT decision rights for superior results*. Harvard Business Press.

West, D. M. 2004. "E-government and the transformation of service delivery and citizen attitudes," *Public Administration Review* (64:1), pp 15-27.

Westphal, J. D. 1999. "Collaboration in the boardroom: Behavioral and performance consequences of CEO-board social ties," *Academy of Management Journal* (42:1), pp 7-24.

Wilkin, C. L., and Chenhall, R. H. 2010. "A review of IT governance: A taxonomy to inform accounting information systems," *Journal of Information Systems* (24:2), pp 107-146.

Willcocks, L. P., Feeny, D., and Islei, G., 1997. *Managing Information Technology as a Strategic Resource*. McGraw-Hill, Berkshire, GB.

Williamson, O. E. 1999. "Strategy research: governance and competence perspectives," *Strategic Management Journal* (20:12), pp 1087-1108.

Winter, S. G. 2003. "Understanding dynamic capabilities," *Strategic Management Journal* (24:10), pp 991-995.

Wischnevsky, J. D., and Damanpour, F. 2006. "Organizational transformation and performance: An examination of three perspectives," *Journal of Managerial Issues* (18:1), pp 104-128.

Wolf, M., Beck, R., and Pahlke, I. 2012. "Mindfully resisting the bandwagon: reconceptualising IT innovation assimilation in highly turbulent environments," *Journal of Information Technology* (27:3), pp 213-235.

Xue, L., Ray, G., and Sambamurthy, V. 2012. "Efficiency or innovation: How do industry environments moderate the effects of firms' IT asset portfolios?," *MIS Quarterly* (36:2), pp 509-528.

Xue, Y., Liang, H., and Boulton, W. R. 2008. "Information technology governance in information technology investment decision processes: The impact of investment characteristics, external environment, and internal context," *MIS Quarterly* (32:1), pp 67-96.

Yin, R. K., 2003. *Case Study Research: Design and Methods*. Sage Publications, Thousand Oaks, CA.

Zahra, S. A., and George, G. 2002. "Absorptive capacity: A review, reconceptualization, and extension," *Academy of Management Review* (27:2), pp 185-203.

Zollo, M., and Winter, S. G. 2002. "Deliberate learning and the evolution of dynamic capabilities," *Organization Science* (13:3), pp 339-351.

APPENDIX A

Coding of Qualitative Data in Part 1

Open-ended Questions

• To what extent do executives have a strong understanding of the role of IT and the firms' dependence on IT? (Jaklič and Štemberger, 2009)

• To what extent have senior managers defined and enforced a formal process for aligning IT and government strategies during strategic planning? (Dhillon et al., 2008; Hjort-Madsen, 2007)

• To what extent do senior managers communicate responsibilities to all personnel in the enterprise for exploiting IT in improving operations? (Grant et al., 2007; Jaklia and Šand at ex, 2009)

• What modules of ERP (enterprise resource planning) have you implemented? (e.g., Financial (AR, AP, GL), purchasing, inventory, asset management, human resources, CRM, operations management? (Lyytinen et al., 2009; Ranganathan & Brown 2006)

Coding Matrices

Table A1. Matrix for coding subjects' responses to semi-structured questions in Part 1, with supporting studies

Constructs	Characteristics per state of capability maturity				Supporting Studies
Attributes Question	State 1 Initial	State 2 Repeatable	State 3 Defined	State 4 Managed	
(i) IT GOVERNANCE MECHANISMS					
Envisioning					
Strategic vision What is the emphasis of the strategic vision defined by council with respect to the role of IT in supporting business processes?	Localized processes, low IT integration across departments	Localized processes, IT integrated across departments	Standardized processes, some enterprise systems integration	Global process standardization , highly integrated enterprise systems	Fountain 2001; Hansen et al. 2011; Huang and Tilley 2003; Jaklič and Štemberger 2009; Ke and Wei 2004; Ross et al. 2006; Willcocks et al. 1997
Initiating					

Project Funding Priorities What are the primary types of applications that receive project funding?	Individual applications	Shared, standardized hardware infrastructure	Integrated enterprise applications	Reusable business process components	Capati-Caruso and Valle 2006; Jaklič and Štemberger 2009; Layne and Lee 2001; Mimicopoulos 2004; Ross et al. 2006
Diagnosing					
Process Documentation To what extent are business processes "as-is" well documented and used to inform IT-enabled transformation initiatives?	Business processes not formally documented on a consistent basis	Documentation exists for some localized functions	Documentation of standardized enterprise business processes	Quality management goals formalized for business processes	Huang and Tilley 2003; Jaklič and Štemberger 2009; McAdam and Mitchell 1998; Ross et al. 2006
Redesigning					
Process Owners Which managers are responsible for control, documentation and testing of business processes?	Ad hoc	IT department	Functional department managers	Senior managers	Hansen et al. 2011; Jaklič and Štemberger 2009; Ross et al. 2006
Strategic IT-enabled initiatives What is the primary strategic objective of IT-enabled transformation initiatives?	Local/ functional optimization	IT efficiency	Business process efficiency	Responsive to new service demands	Dhillon et al. 2008; Jaklič and Štemberger 2009; Ross et al. 2006; Weerakkody et al. 2008; Willcocks et al. 1997
Reconstructing					
Professionalism in IT management What is the most salient strategic leadership skill of IT directors (CIOs)?	IT-enabled change management	Design and update of standards; funding shared infrastructure	Core enterprise process definition and measurement	Management of reusable business processes	Hansen et al. 2011; Irani et al. 2007; Ross et al. 2006
Evaluating					

Evaluation methods Describe the nature of mechanisms used to justify e-government investments and to evaluate outcomes from the investments?	ROI of local business initiatives	Reduced IT costs	Cost and quality of business operations	Providing customer service when, where and how they want it	Irani et al. 2005; Jaklič and Štemberger 2009; Ross et al. 2006
Performance Monitoring Which stakeholders (executives, functional department directors, IT management, auditors) typically have responsibility for monitoring the performance of IT-enabled transformation initiatives?	Predeomina-ntly IT department decision	IT managers, functional department managers responsible	IT managers, functional department managers, executives responsible	IT managers, functional department managers, executives, compliance/ auditors responsible	ITGIOGC 2005; McAdam and Mitchell 1998; Ross et al. 2006; Weill and Ross 2004; Willcocks et al. 1997; Xue et al. 2008
(ii) TECHNOLOGY ENACTMENT					
Process Maturity Which of the following best characterizes how enterprise IT is used in support of business processes at present?	Ad-hoc and unstructured processes; processes localized, isolated from other functional departments	Basic processes defined but processes enacted in traditional fashion; no substantial change	Many but not all core processes standardized and integrated across departments	Organization restructured around end-to-end processes; all core processes standardized and integrated	Dhillon et al. 2008; Huang and Tilley 2003; Irani et al. 2007; ITGI 2008; Jaklič and Štemberger 2009; SEI 2006; Valdés et al. 2011

Table A2. Matrix for coding distribution of decision rights and accountability for IT-related strategic decisions

		Which stakeholders have accountability for each decision?			
Decisions:		Senior Executives	Department Managers	IT Management	Audit/ Compliance
(a) Plan & Organize	Strategy alignment	■	■	■	
	Optimum resource use	■	■	■	■
	Strategy communicated	■	■	■	■
	IT risk		■	■	■
	IT design/acquisition		■	■	
(b) Imple-ment	New projects meet needs		■	■	
	On-time on-budget		■	■	
	IS works properly		■	■	
	Minimize disruption		■	■	
(c) Delivery &Support	IT service meets needs		■	■	
	Optimized IT costs	■	■	■	
	Productive & safe use		■	■	
	Integrity, availability		■	■	■
(d) Mo nito	Monitor IT performance	■	■	■	
	Independent assurance	■			■

Notes: ■ = COBIT best practice

Coding Protocols

Protocol used to code Envisioning mechanisms: We asked each IT director to select which of the following four characterizations best describe the IT-related emphasis of their governments' strategic vision (e.g., mission statement, strategic plan): department-specific or "localized" business processes and little integration of disparate IT across departments (state 1); department-specific ("localized") business processes with some integration of disparate IT across departments (state 2); standardized enterprise-wide business processes with some integration of IT across departments; enterprise-wide ("global") business processes and highly integrated enterprise systems (Huang and Tilley, 2003; Ross et al., 2006). We then inquired about (1) executive understanding of the strategic role of IT, and (2) the process used to align IT and organizational strategies using open-ended questions (replicated above). We assessed how acquisition decisions related to IT architecture and infrastructure strategies are made at each site in order to align IT and business strategies. IT-related acquisition decisions have an impact on both capital budgets (e.g., cost of software licenses, hardware) and operating budgets (e.g., ongoing maintenance and support costs). Therefore, we obtained from IT directors and audited financial statements (1) IT department operating and capital budgets and (2) IT-related operating expenses and capital investments that fall under other departments' budgets. We then computed the ratio of per-capita IT-related funding controlled by IT directors versus functional department heads. Functional departments having dominant authority (i.e., control nearly all IT-

related acquisitions) are indicative of state 1 (Hjort-Madsen, 2007; Ke and Wei, 2004; Preston et al., 2008; Weill, 2004; Willcocks et al., 1997). IT departments having some minority control while functional departments have majority of control indicates state 2. IT departments having majority control while functional departments have minority control indicates state 3, and senior IT management having authority with full support of executive team indicates state 4.

Protocol used to code Initiating mechanisms: Through governments' IT governance life cycle, priorities for project funding shift from funding individual applications (i.e., driven by departments in state 1), to shared IT infrastructure, to enterprise applications, and finally to reusable sets of business processes in state 4 (Heeks and Stanforth, 2007; Ross et al., 2006). Which stakeholder group has primary authority to define application design and acquisition shifts from functional departments starting in state 1, to IT department plus business unit leaders in state 2, to senior management plus process owners in state 3, and finally to a collaborative of senior IT and business leaders in state 4 (Ross et al., 2006; Weill, 2004; Xue et al., 2008). For comparison purposes, how each site governs IT-related planning and organizing decisions was assessed using the COBIT framework (presented in Table A2, cf. ITGIOGC, 2005). Specifically, IT departments making planning and organizing decisions on their own are indicative of state 1 (ITGI, 2008). Cumulatively adding functional department managers, then executives, then compliance/auditors to the planning and organizing decision process indicates state 2, 3 and 4 respectively.

Protocol used to code Diagnosing mechanisms: Diagnosis is an essential mechanism manifest in documenting "as is" and "to be" business processes in order to elucidate the organizational changes required to achieve the vision (Ross et al., 2006). At state one, processes are not documented on a consistent basis (Huang and Tilley, 2003). At state two, documentation exists for some localized (i.e., departmental) functions. At state three, standardized processes are documented for the enterprise. At state 4, firms add quality management goals for enterprise business processes.

Protocol used to code Redesigning mechanisms: At each state of the IT governance life cycle, process ownership changes characteristically from ad hoc ownership in state one, to IT department ownership in state two, to functional department managers' ownership in state three, to the collaborative ownership of senior managers in state 4 (Jaklič and Štemberger, 2009; Ross et al., 2006). The strategic objectives of IT-enabled initiatives (Dhillon et al., 2008; Jaklič and Štemberger, 2009; Weerakkody and Dhillon, 2008) also change from local functional optimization in state one, to IT efficiency in state two, operating

efficiency in state three, and responsiveness to new service demands in state 4 (Ross et al., 2006).

Protocol used to code Reconstructing mechanisms: How each site governs IT delivery and support decisions was compared using the COBIT framework (presented in Table A2) as follows (ITGIOGC, 2005; Jaklič and Štemberger, 2009; Tsai et al., 2009). Specifically, IT departments making IT delivery and support decisions on their own are indicative of state 1 (ITGI, 2008). Cumulatively adding functional department managers, then executives, then compliance/auditors to the IT delivery and support decision process indicates state 2, 3 and 4 respectively.

Protocol used to code Evaluating mechanisms: Evaluation methods in government organizations differ by state of IT governance life cycle: short-term return on investment (ROI) in state 1, cost-of-IT metrics in state 2, evaluating the cost and quality of business processes in state 3, providing customer service when, where and how customers want it in state 4 (Irani et al., 2005; Jakli. and Šand ., 20, 2009). For comparison purposes, how each site monitors the performance of IT-enabled initiatives was compared using the COBIT framework (Table A2). Specifically, IT departments monitoring performance on their own are indicative of state 1 (ITGI, 2008). Cumulatively adding functional department managers, then executives, then compliance/auditors to shared responsibility for monitoring performance indicates state 2, 3 and 4 respectively.

Protocol used to code Technology Enactment: To assess actors' technology enactment we asked IT Directors to discuss which descriptions of process maturity (as defined in Table A1, Technology Enactment) best characterize their site.

Protocol used to code Performance Outcomes: In order to assess the efficiency business outcomes of transformational e-government, we computed two metrics. First, because governments seek to realize efficiencies by using enterprise systems to reduce or eliminate the duplication of efforts between divisions (United Nations, 2008), we computed the number of personnel required at each site to deliver local government services to citizens on a per-capita (i.e., per-citizen) basis. Second, following the efficiency metrics used by the province to assess local governments (MMHA, 2010), we gathered data from audited annual financial statements to compute the total annual operating costs (e.g., salaries, maintenance costs) each government expends to deliver local government services to citizens on a per-capita (i.e., per-citizen) basis.

APPENDIX B

Table B1. Results of ANOVA testing response bias between early and late responders

Measure	Comparison	Sum of Squares	df	Mean Square	F	Sig.
State of Transition	Between Groups	0.0	1	0.0	0.025	0.874
	Within Groups	60.0	97	0.6		
	Total	60.0	98			
Revenues	Between Groups	9.46E+17	1	9.46E+17	0.874	0.352
	Within Groups	1.04E+20	96	1.08E+18		
	Total	1.05E+20	97			
Perceived Value of Advice (First source)	Between Groups	0.3	1	0.3	0.044	0.834
	Within Groups	272.5	39	7.0		
	Total	272.8	40			
(Second source)	Between Groups	0.2	1	0.2	0.028	0.869
	Within Groups	227.8	31	7.3		
	Total	228.0	32			
(Third source)	Between Groups	1.2	1	1.2	0.273	0.607
	Within Groups	89.3	21	4.3		
	Total	90.4	22			
(Fourth source)	Between Groups	2.3	1	2.3	0.426	0.526
	Within Groups	65.7	12	5.5		
	Total	68.0	13			
Executive Monitoring (Item 1)	Between Groups	0.3	1	0.3	0.262	0.610
	Within Groups	118.2	97	1.2		
	Total	118.5	98			
(Item 2)	Between Groups	1.0	1	1.0	0.464	0.497
	Within Groups	200.2	97	2.1		
	Total	201.1	98			
(Item 3)	Between Groups	4.2	1	4.2	2.637	0.108
	Within Groups	155.7	97	1.6		
	Total	160.0	98			
Financial Incentives (Item 1)	Between Groups	7.6	1	7.6	3.514	0.064
	Within Groups	195.7	91	2.2		
	Total	203.2	92			
(Item 2)	Between Groups	2.3	1	2.3	2.319	0.131
	Within Groups	86.9	89	1.0		
	Total	89.2	90			

APPENDIX C

Structured Questionnaire and Instrument Sources for Part 2

1) Respondent information: (a) your name, (b) your title, (c) official name of your municipal government organization, (d) what form of municipal government is your organization, (e) in what province does your municipality serve, (f) how many years have you worked in this organization?

2) Please name the CIOs (IT Directors) at up to five municipalities who you believe were most helpful in providing advice to you regarding enterprise ICT acquisitions and/or enterprise ICT strategy in the past twelve months. (Source: Cross and Sproull 2004)

3) Complete for each contact named above: The information/advice I received from this person contributed (or is likely to contribute) to enterprise ICT impacts on… (Scale: 1-Weak impacts to 10-Strong impacts; Source: Tallon 2010)

    a) …improving the firm's financial performance through improved operating efficiency (savings).

    b) …improving my organization's ability to provide administrative support to customers; facilitate a higher level of flexibility and responsiveness to customer needs; provide online access to my organization's services for customers.

    c) …enhancing business processes by improving internal communication and coordination;improving management decision making; streamlining business processes.

    d) …reducing the development time for new services; reducing the time to market (i.e., from concept to first delivery) for new services; reducing the cost of designing new services.

4) The term "IT unit" refers to your organization's IT department, and "line functions" refers to the various departments in your organization, such as accounting, human resources, economic development, water and waste services, police and fire, roads, recreation and parks. Please rate how the primary responsibility for the following decisions was distributed between the IT unit and the line functions during the past twelve months. (Specific

decisions and responses answered as per Table A2; Source: ITGI 2008; ITGIOGC 2005).

5) We refer to the "board" as the body of elected officials and C-level managers of the organization. (Scale: 1-Minimally to 5-Very much so; Source: McDonald et al., 2008).

   a) To what extent does the board monitor the CIO's strategic decision making?

   b) To what extent does the board formally evaluate the CIO's performance?

   c) To what extent does the board defer to the CIO's judgment on final strategic decisions? (reverse coded)

6) Financial Incentives (Scale: 1-Not at all to 5-To a large extent; Source: Fey and Furu 2008)

   a) Does the organization evaluate your performance in order to determine pay grade?

   b) Are pay grades closely linked to improved operational efficiencies (reduced cost of operations) of the organization?

APPENDIX D

Table D1. Truth table results

Seeker's State of Technology Enactment	Truth table for mindfulness indexed on:	Possible combinations of antecedents					Evidence for each combination		
		Seekers' prior financial performance			Executive Monitoring	Financial Incentives	Number of Cases	Selection Criteria	Consistency
		ROA	OSR	Reserves					
State 1 to 2	(A) ROA*	1	0	0	1	n/a	11	0	0.401189
		0	0	1	1	n/a	2	0	0.606684
		1	1	1	1	n/a	2	0	0.414938
		and 13 possible combinations with no evidence							
	(B) OSR	1	0	0	1	n/a	11	0	0.563150
		0	0	1	1	n/a	2	0	0.604113
		1	1	1	1	n/a	2	1	0.809129
		and 13 possible combinations with no evidence							
	(C) Reserves	1	0	0	1	n/a	11	0	0.699851
		0	0	1	1	n/a	2	1	0.897172
		1	1	1	1	n/a	2	1	0.800830
		and 13 possible combinations with no evidence							
State 2 to 3	(D) ROA	1	0	1	1	0	10	1	0.800000
		0	0	0	0	0	5	0	0.732177
		0	1	1	1	1	5	0	0.759322
		0	0	0	1	0	4	0	0.780488
		0	1	0	1	0	4	0	0.683916
		1	1	0	1	0	4	0	0.525205
		0	0	1	1	0	2	1	0.872881
		1	0	0	1	0	2	0	0.710280
		and 24 possible combinations with no evidence							
	(E) OSR*	1	0	1	1	0	10	0	0.489960
		0	0	0	0	0	5	0	0.302505
		0	1	1	1	1	5	0	0.615254
		0	0	0	1	0	4	0	0.541463
		0	1	0	1	0	4	0	0.671328
		1	1	0	1	0	4	0	0.528722
		0	0	1	1	0	2	0	0.472881
		1	0	0	1	0	2	0	0.405874
		and 24 possible combinations with no evidence							
	(F) Reserves	1	0	1	1	0	10	0	0.697189
		0	0	0	0	0	5	0	0.780347
		0	1	1	1	1	5	0	0.798305
		0	0	0	1	0	4	1	0.881301
		0	1	0	1	0	4	1	0.812587
		1	1	0	1	0	4	0	0.641266
		0	0	1	1	0	2	1	0.893220
		1	0	0	1	0	2	0	0.659546
		and 24 possible combinations with no evidence							
State 3 to 4	(G) ROA	1	0	0	1	0	7	0	0.448333
		0	0	1	1	0	5	0	0.573237
		0	1	0	1	0	5	0	0.520992

		1	1	0	0	0	5	0	0.762742
		0	1	1	1	0	4	0	0.446519
		0	0	1	0	0	3	0	0.530928
		0	1	0	0	0	3	0	0.654088
		0	1	1	0	0	3	0	0.680073
		0	1	1	0	1	3	1	0.916244
		1	0	1	1	0	3	0	0.603448
		0	1	1	1	1	1	1	0.857881
		1	1	0	1	0	1	0	0.543814
		and 20 possible combinations with no evidence							
	(H) OSR	1	0	0	1	0	7	1	0.996667
		0	0	1	1	0	5	1	0.864376
		0	1	0	1	0	5	1	0.980916
		1	1	0	0	0	5	1	0.940246
		0	1	1	1	0	4	0	0.714771
		0	0	1	0	0	3	0	0.664948
		0	1	0	0	0	3	0	0.641509
		0	1	1	0	0	3	0	0.603290
		0	1	1	0	1	3	1	0.870558
		1	0	1	1	0	3	1	0.832289
		0	1	1	1	1	1	1	0.917313
		1	1	0	1	0	1	1	0.835052
		and 20 possible combinations with no evidence							
	(I) Reserves *	1	0	0	1	0	7	0	0.728333
		0	0	1	1	0	5	0	0.546112
		0	1	0	1	0	5	0	0.585878
		1	1	0	0	0	5	0	0.694200
		0	1	1	1	0	4	0	0.382003
		0	0	1	0	0	3	0	0.731959
		0	1	0	0	0	3	0	0.735849
		0	1	1	0	0	3	0	0.544789
		0	1	1	0	1	3	0	0.730964
		1	0	1	1	0	3	0	0.648903
		0	1	1	1	1	1	0	0.775194
		1	1	0	1	0	1	0	0.451031
		and 20 possible combinations with no evidence							

Note: * Three of the nine truth tables were dropped from further analysis because insufficient cases met the minimum consistency criterion of 0.80: (1) the set of seekers in state 1 exhibiting mindfulness based on ROA ratio (Table 11.1, row A), (2) the set of seekers in state 2 exhibiting mindfulness based on OSR ratio (Table 11.1, row E), (3) the set of seekers in state 3 exhibiting mindfulness based on Reserves ratio (Table 11.1, row I).