Process Ambidexterity for IT Entrepreneurship

Sonia D. Bot and Paul E. Renaud

> " *If everything is under control, you're going too slow.* "
>
> Mario Andretti
> Retired world champion racing driver

All firms use information technology (IT). Larger firms have information technology organizations whose business function is to supply and manage IT infrastructure and applications to support business needs for IT. While some firms have chosen to outsource the IT function, the majority rely on an internal IT organization that is focused on running the IT infrastructure and optimizing IT operations and applications by exploiting technology improvements over time. Most IT organizations have little capacity to carry out transformational initiatives because they are focused on incremental improvements needed to run the business. As the global economy contracts, growing cost pressure on firms escalates the need for the IT function to behave in a more entrepreneurial manner that accelerates the availability of new technological solutions to enhance productivity and lower cost of doing business.

This article provides a process-based perspective for understanding and addressing an IT function's ability to implement entrepreneurial practices that better align the IT function to business functions. This is done by developing the capability of process ambidexterity. Improving an IT organization's entrepreneurial ability results in improved productivity, shorter time to market, and lower operational costs – as validated by recent practice with major firms in the USA. Developing process ambidexterity in the IT function benefits those who govern IT, the executives who lead IT, as well as their peers in the business functions that depend on IT.

Introduction

Bot (2012; timreview.ca/article/547) described a process-based perspective to balancing mainstream exploitation and new-stream exploration in the management of innovation-based technology firms. The resulting capability is known as process ambidexterity and requires disciplined, agile, and lean business management.

Building upon the definition proposed by Lee and colleagues (2009; tinyurl.com/9lxgjjt) and Bot (2012; timreview.ca/article/547), *process ambidexterity* is a firm's capability for utilizing both process alignment and process adaptability. *Process alignment* deals with rigour, discipline, consistency, and maturity of the processes. *Process adaptability* deals with agility, responsiveness, flexibility, and customization of the processes.

This article examines how the concepts of process ambidexterity can be applied to the IT function within a firm whose broad mandate is to provide businesses with applications and core infrastructure resources that enable their firm's business strategy and execution. This includes automating business processes, capturing customer transactions, synthesizing and providing information to support decision making, and promoting productivity and collaboration. This article uses the terminology of "business value chains", "business functions", and "business activities" established by Porter (1985; tinyurl.com/8ul8upn).

Most IT organizations have optimized themselves for *operations* (that is, *Running the Firm*) but not for *change* (that is, *Transforming the Firm*). They are primarily focused on the supply chain of technology (*IT*

Process Ambidexterity for IT Entrepreneurship

Sonia D. Bot and Paul E. Renaud

Supply) at the expense of the differences in need for technology across the firm's business value chains (*Business Demand*). This is evident in how the IT function is organized, which is typically silo-oriented around technological domains such as data centre operations, networks, storage, computing, and applications. These internal IT groups focus on technology evolution and engineering related to incremental technology advancement in which "change" is limited to change-management practices intended to reduce the risk of upgrades to existing technologies. Consequently, transformational change is often introduced by end users who force technological innovation onto a reluctant IT organization; examples over time include: microcomputers, desktop productivity applications, business intelligence tools, websites, smartphones, and tablets. IT organizations in many cases have little capacity, no experience, and no processes to innovate and lead transformational change on their own.

This article considers how mainstream exploitation and entrepreneurial exploration apply to the IT function of firms. Exploratory practices support entrepreneurship when they are customer facing and value seeking. The balanced application of both exploitative and exploratory approaches to managing IT introduces a new entrepreneurial aspect within firms of all sizes – regardless of whether the firm as a whole might be characterized as mainstream or entrepreneurial. In other words, it is possible for the IT function of a firm to acquire the advantages of an entrepreneurial approach even if the firm itself is a large well-established, mainstream business or government agency.

Entrepreneurship in IT requires processes for managing Business Demand by aligning to the firm's priorities and for exploring new ways of satisfying that demand. Process ambidexterity is introduced along with supporting mechanisms as a means to achieve balance between exploitation and exploration, and thus foster IT entrepreneurship.

The benefits of this approach were validated in practice with large firms such as Sprint, Morgan Stanley, and Wachovia/Wells Fargo (Bishop, 2009; tinyurl.com/8zvljsk). The resulting improvement from employing entrepreneurial practices include improved productivity, shortened time to market, increased revenue, and lowered overall operational costs. As an example, applying process ambidexterity principles at Wachovia's investment bank led to significantly improved service levels at half the ongoing cost of IT delivery. The intro-

duction of new innovations were transformational to that firm; for example, introducing the capability for real-time calculation of intra-day trade risks enabled Wachovia to cost-effectively offer new products based on a wide variety of derivative combinations of equity and debt securities.

Mainstream Exploitation and New-Stream Exploration in IT

Exploitation is fundamentally about utilizing what you already have in an incremental, progressive, and step-wise manner (Table 1). In an IT context, *mainstream exploitation* refers to the evolution of the existing infrastructure and applications that service the current needs of the firm. There are many well-established IT processes and standards for mainstream exploitation such as ITIL (tinyurl.com/mukhg), COBIT (tinyurl.com/cthkvgk), and the Enhanced TMN Operational Model (eTOM; tinyurl.com/yctfjk7), as well as best practices recommended by major IT vendors. IT organizations use these processes to exploit what they already know and the resources they already have to make existing situations systematically better. Progress is sequential, predictable, and evolutionary but cannot be transformational since the future is a linear projection of the past.

Exploration is fundamentally about experiential discovery of discontinuous opportunities by researching what IT organizations do not know about the technologies they do not yet have, to see if they should acquire them (Table 1). In an IT context, *new-stream exploration* refers to the entrepreneurial practice of new-technology adoption intended to enable new business activities or to transform the delivery of existing activities beyond the limitations of currently deployed IT solutions. IT organizations pursue an iterative, trial-and-error approach to learning more about what they do not yet know, to determine whether new ways or technologies should be pursued. This approach leads to transformational change since the future is not necessarily limited by the past.

When relying only on an exploitative approach, the bar is never set high enough for the result to be transformational to the firm. Few IT organizations are able to strike a balance between exploitation and exploration because IT managers are incented to ensure that the infrastructure for running the business is reliable and low risk. Aggressive objectives and high-risk strategies are not encouraged by the culture of most IT organizations.

Process Ambidexterity for IT Entrepreneurship

Sonia D. Bot and Paul E. Renaud

Table 1. Characteristics of mainstream exploitative IT and new-stream exploratory IT*

Dimension	Operational IT (Mainstream Exploitation)	Entrepreneurial IT (New-stream Exploration)
Strategic Intent	Running organization efficiently	Enabling transformation, changing cost structure
Alignment	IT Supply Chain	Business Value Chain
Management Goal	Keep business running	Cost-effective business impact
Investment Focus	Advancing current technologies, serving current customers	Exploring new, emerging technologies, enabling new business activities
Key Metrics	IT effectiveness and efficiency	Return on IT investment
Critical Tasks	Operations, efficiency, incremental innovation, refinement	Adaptability, new IT solutions, breakthrough innovation, meeting unmet needs
Competencies	Operational, change management	Entrepreneurial, risk management
Structure	Formal, procedural	Adaptive, outcome-driven
Controls & Rewards	Operational expenditures, service delivery	Capital expenditures, productivity
Culture	Efficiency, low risk, quality, operations	Speed, flexibility, experimentation, projects
Employee Skills	Refine current skills and capabilities	Develop entirely new skills
Leadership role	Authoritative, protective	Visionary, involved

*Adapted from Bot (2012; timreview.ca/article/547), O'Reilly and Tushman (2004; tinyurl.com/cj6arfy), and Morris et al. (2010; tinyurl.com/cesk9lz).

Not surprisingly, most IT resources are devoted to operation, maintenance, and support, that is, the smooth running of the existing environment, with the balance dedicated to exploitative projects intended to remove the known problems in the firm's computing experience. This is accompanied by extensive processes for operational IT such as change management, problem management, and service management. By contrast, most IT organizations lack resources to explore new technologies and few have processes for aligning with or responding to the changing needs of the firm. New-technology introduction projects are usually "wild cat" with few constraints and no metrics, and they are rarely repeatable.

For example, during the 1980s, most IT organizations pursued exploitation of minicomputer and mainframe-based timesharing. Meanwhile, end-user business units explored the use of PCs and forced many IT organizations to respond to the transformational opportunities that network-based computing offered. History repeated itself with Internet-enabled computing in the 1990s and again with smartphone/tablet computing in the current millennium. These are all examples of transformations led by entrepreneurial users adopting technology ahead of their IT organizations.

Both lack of alignment and poor adaptation of processes are intrinsic sources of the imbalance between

Process Ambidexterity for IT Entrepreneurship

Sonia D. Bot and Paul E. Renaud

mainstream exploitation and entrepreneurial exploration, where exploitation trumps exploration in practice. Process ambidexterity is a capability that is essential for breaking out of this patterned behaviour.

Process Ambidexterity to Achieve Balance

Process ambidexterity requires disciplined, agile, and lean management. Below and in Figure 1, five mechanisms that managers can use to achieve balance through process ambidexterity in an IT context are presented. These mechanism are adapted from Bot (2012; timreview .ca/article/547) and are based on best practices as well as applying academic theory to an IT context. These mechanisms are:

i. Business-aligned IT governance that includes a process for balancing the Business Demand with the IT Supply

ii. Key performance indicators (KPIs) and balanced scorecards
    a. Top level: demand management
    b. Sub-level: supply management
    c. Sub-level: capability management

iii. IT management and processes based on a process-management control system

iv. Disciplined improvement

v. Organizational structure and leadership

Figure 1 also depicts a process ambidexterity framework with three components:

1. Demand management involves understanding business requirements so that IT can be best aligned to fulfill them. The inherent trade-off between control and growth must be evaluated for each business function with different outcomes possible for different business functions. In times of positive or negative economic stress on the business, managing demand requires greater emphasis on transformational change, such as using technology to lower the delivery cost of business services.

2. Supply management involves ongoing engineering, optimization, and operation of the existing IT supply chain of resources (e.g., networks, storage, systems, applications), in short, everything required to keep the business running.

3. *Capability management* involves proactive management of the people, processes, and technical capabilities and competencies required to support the components described above. IT has diverse technical specialities as well as business analytic, project management, risk management, contracting, and financial skills. In large firms, IT must manage these capabilities globally, encompassing many regulations, labour laws, and social customs.

These three components are measured by KPIs and are reported via "balanced scorecards" that are layered. At the top level, KPIs for demand management focus on business priorities and ensure alignment of IT investment decisions with the needs of the firm. At the sub-levels, KPIs for supply management measure process performance to ensure IT process effectiveness, and KPIs for capability management address IT process maturity.

These KPIs focus on what is important and signal what is not working. They identify performance gaps, which can then be prioritized into disciplined improvement initiatives. The outcomes of improvement initiatives are measureable and are reflected in balanced scorecards. Throughout this cycle, organizational structure, leadership, and capability maturity require accountability based on clear ownership, commitment, and competencies.

Business-aligned IT governance
In the post-Enron era, IT governance became increasingly formalized with elaborate risk management, process standards, and control frameworks (e.g., COBIT, ITIL, ISO 17799). It is widely accepted that effective governance is not merely about compliance with controls, but also the creation of a culture that improves enterprise-wide decision making (including risk management) and the transparency of decision-making processes.

Improving decision making in IT is synonymous with improving alignment between business objectives and IT planning. The importance of aligning IT to business strategy is well established (Henderson and Venkatraman, 1993; tinyurl.com/8j7kd4a). Strategic alignment-assessment models, such as those by Luftman and colleagues (2000: Comm. of Austral. Info. Soc., Vol 4; 1999: tinyurl.com/8r24c2q), focus on which elements of business and IT should be aligned and how maturity might be ascertained. A critical success factor for IT governance is ensuring that IT is and remains aligned to the needs of

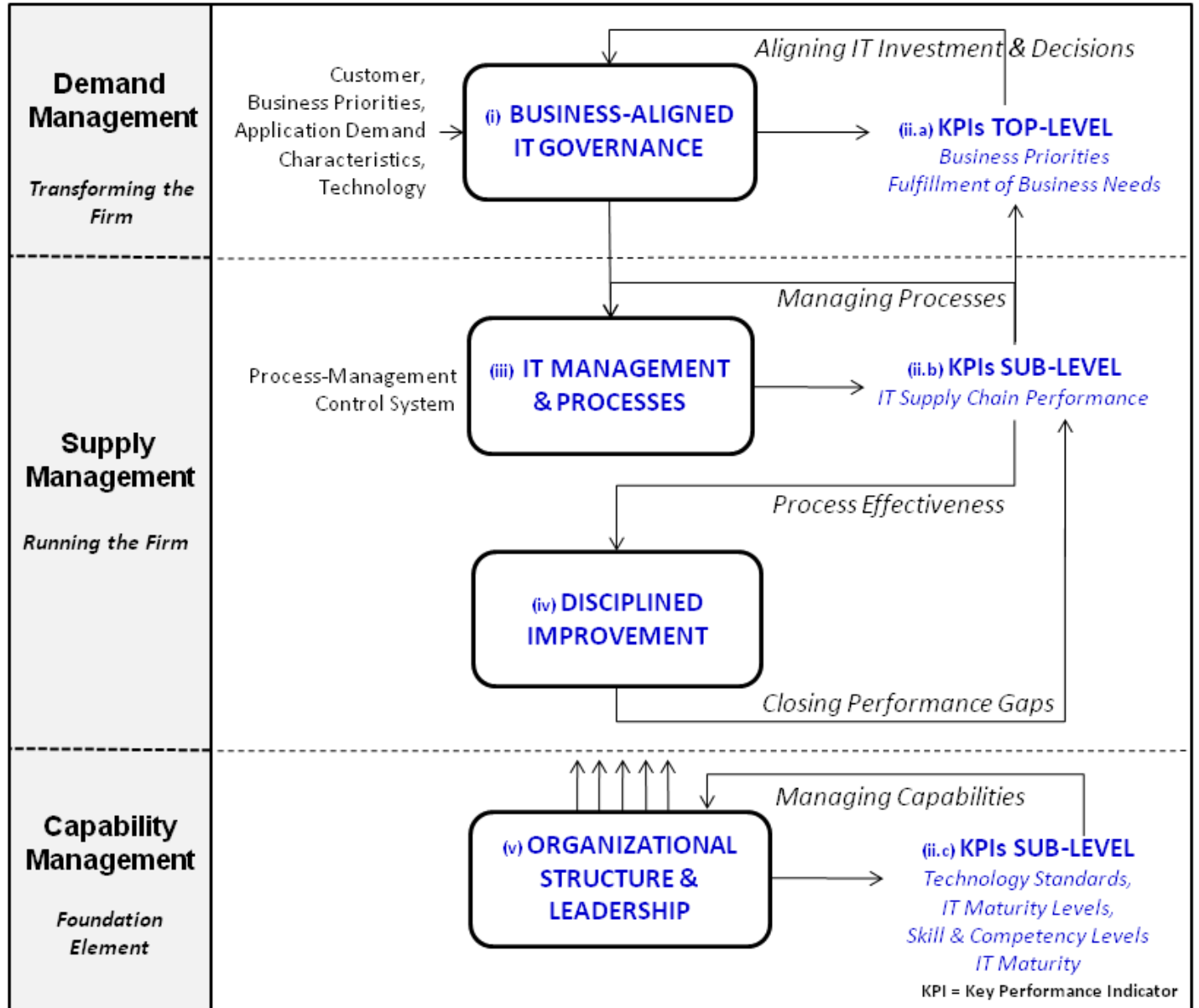# Process Ambidexterity for IT Entrepreneurship

Sonia D. Bot and Paul E. Renaud

Figure 1. Process ambidexterity mechanisms for IT

Process Ambidexterity for IT Entrepreneurship

Sonia D. Bot and Paul E. Renaud

the business it serves (De Haes and Van Grembergen, 2004; tinyurl.com/8grjjow). It is also recognized that this cannot be achieved via structural alignment, but requires a dynamic approach to alignment (Leonard, 2008; tinyurl.com/8vphe6c).

In practice, aligning IT to the needs of the firm is difficult because both IT budgets and resources are finite and are always less than Business Demand. Needs must be understood and prioritized, investment trade-offs must be evaluated and weighed against existing initiatives, service level objectives must be negotiated, and transition roadmaps must be aligned to respond in time to support business initiatives. IT issues that become more pronounced with the size of the firm include:

- balancing the need for increased control by the IT function and greater business flexibility within business functions

- maintaining the degree of control required by corporate governance policies

- ensuring that the allocation of infrastructure is commensurate with changes to business priorities (which may require rebalancing resources)

Any dynamic approach to business alignment must be rooted in the processes for governing the IT function. While business-aligned governance of IT may be done informally in some IT organizations, it is not done at all in many, and very few have well-defined processes for ensuring business alignment such as profiling business demand by business function, mapping usage patterns, and a system of KPIs for predicting and assessing alternative IT outcomes.

The IT priorities of a firm will vary greatly by business function – even within the same business value chain. IT alignment is maximized by using a profile of Business Demand by business function because the inherent trade-off between control and flexibility can be evaluated differently for different business functions. Some functions (such as accounting) may require very tight control and a low-risk computing environment characterized by high-availability computing clusters, while others (such as sales) may require more flexibility in using new technologies for messaging, collaboration, and mobility. IT governance that allows for variation by business function can transcend these differences while maintaining a common governance framework

and ensuring that the consumption of resources by business function is aligned to investment priorities for each function.

Key performance indicators and balanced scorecards
The advantages to linking balanced scorecards for managing business objectives to a balanced scorecard for IT has been proven (Van Grembergen, et al., 2003; tinyurl.com/8d84del). Process alignment can be further improved by adding an adaptive process for maintaining strategic IT alignment that is measured by top-level KPIs that focus on demand management. These KPIs must measure: i) enablement of business priorities (IT Strategic Balanced Scorecard); ii) alignment to user requirements (IT Development Balanced Scorecard); and iii) satisfaction of service-level objectives (IT Operational Balanced Scorecard).

Any balanced scorecard for organizing top-level IT KPIs must encompass all three areas and be defined in business terms that are anchored in business priorities. For example, IT must always be cost-effective. Yet, this would not be a top-level KPI unless there was an overall business priority to reduce costs – for example, a bank might improve its capital ratio by mandating a cost-takedown in IT since profit is the cheapest form of capital and IT cost savings go straight to the bottom line – or a specific business function might need to lower its spending on IT. In the absence of a business-driven priority, the KPI would be a sub-level indicator of process performance.

Sub-level indicators for supply management are anchored in process performance and are based on IT planning, development and engineering, and operations. Since each of these areas is implemented by processes that require specific technologies, skills, and competencies, these KPIs are supported by another set of KPIs focusing on capability management and relate to the maturity level of IT capabilities (i.e., people, processes, and technical capabilities). For example, IT operations includes processes for systems monitoring, problem management, and change management and each of these requires distinct technology (e.g., tools such as monitoring systems, diagnostic and recovery aids, trouble ticket management systems) and skills ranging across clerical to technical to managerial.

IT management and processes based on a process-management control system
A process-management control system is the foundation for managing processes (e.g., alignment, adaptabil-

Process Ambidexterity for IT Entrepreneurship

Sonia D. Bot and Paul E. Renaud

ity, and performance to targets), focusing improvements, and sustaining the gains realized from improvement efforts. This system is based on the continual measurement of process performance (using KPIs and balanced scorecards) against critical business and customer requirements (Bot, 2012; timreview.ca/article/547).

A process-management control system is comprised of:

1. A process owner who is accountable for the governance, performance, and maintenance of the process.

2. Process documentation, including process inputs, outputs, flow, decisions, and roles.

3. KPIs mapped directly to specific process steps with predictive and outcome indicators.

4. Specific monitoring actions and accountabilities for process performance.

While there are many IT process frameworks, such as COBIT, ITIL, and eTOM, the lack of exploratory processes is significant in all these major frameworks, which all focus on the exploitative aspects. From an entrepreneurial perspective, missing exploratory processes include demand profiling, solution integration, IT product management, new technology assessment, and new product introduction.

Disciplined improvement
Improvement initiatives must be approached in a systematic and disciplined manner if they are to succeed. Otherwise, organizations get stuck in a cycle, known as the "capability trap" (Repenning et al., 2001; tinyurl.com/bcr6cw), where they spin for years with ample goodwill to improve (yet not achieve) performance results. Typically, these efforts are not successful because they fail to consider the dynamics of the end-to-end process and identify true root causes. Methodologies that overcome the capability trap by supporting disciplined improvement include Lean, Six Sigma, Design for Six Sigma, and Kaizen (Bot, 2012; timreview.ca/article/547).

These methodologies are widely applied to the exploitative processes in IT. For example, many have adopted some form of Lean in application development (typically Agile methodologies) and in the management of data centres (for example, the Power Usage Effectiveness methodology). Six Sigma and Design for Six Sigma

are encountered in problem and change management processes within IT. However, their application to IT exploration is in its infancy.

Organizational structure and leadership
According to O'Reilly and Tushman (2004; tinyurl.com/cj6arfy), traditional organizational structures impede the balance between exploration and exploitation initiatives. They describe the ideal ambidextrous organization where exploitative and exploratory teams are independent units in which each team has its own processes, structures, and cultures. When integrated into the same senior-management hierarchy, an ambidextrous organization can excel in supporting both exploratory and exploitive initiatives as long as the senior team is committed to operating ambidextrously, even if they are not ambidextrous themselves.

An ambidextrous IT organization can be implemented by making the CTO group responsible for all IT exploratory and exploitative processes including demand profiling, product management, technology introduction, standardization, and engineering. From a governance perspective, the CTO becomes the process owner for demand management. This separates operational IT from entrepreneurial IT practices, and further balance between exploitative and exploratory processes can be achieved by separating different teams within the CTO organization. Operations staff should be seconded on a temporary basis into exploratory activities to ensure that an operational perspective is a part of the entrepreneurial assessment and to lower the resistance of transitioning new-stream technologies into the mainstream, thereby avoiding "toss it over the wall" syndrome.

Furthermore, most IT organizations must pivot their product management practices to be internal-customer facing. They must also deliver products that are fit for purpose (measured by definable and differentiated offered value that responds to different needs across business functions).

When compared to other disciplines, IT organizations have well-developed practices for managing competencies and capabilities. Many IT organizations have separated operations from engineering to improve cost-effectiveness of competency management and some have further outsourced some or all of their operational competencies. Outsourcing exploratory competencies is not recommended for firms that must

Process Ambidexterity for IT Entrepreneurship

Sonia D. Bot and Paul E. Renaud

compete within a fast-moving digital economy because it means ceding entrepreneurship to a third party. The capability model developed by TOGAF (togaf.org) decomposes capabilities into: people, process, technology capabilities, where this model is useful for organizing competency management.

Conclusion

This article provides a process-based framework for understanding and addressing how to balance operational exploitation and entrepreneurial exploration in IT. Entrepreneurial IT enables ongoing business transformation via new processes by understanding value to the firm, implementing innovative new technology to bring about transformational change, and ensuring that IT solutions are well-suited for all addressable internal opportunities.

This article makes two contributions:

1. It identifies that IT can develop an entrepreneurial capability that balances both demand and supply management, and that process ambidexterity enables this in a practical way.

2. It presents a practical and real-world framework for developing process ambidexterity in IT.

By becoming ambidextrous, IT can more effectively and predictably enable transformational change while simultaneously improving efficiency.

Demand management extends the governance function and is tailored to the differing needs of each business function. The resulting impact on IT governance is profound because the process of demand management is formalized to assure dynamic and continuous alignment between the strategic priorities of the firm and IT decision making. Supply management extends existing IT management processes that deal with running the business with a process-management control system and accompanying disciplined improvement.

Process ambidexterity requires committed leadership and a separation of exploitative and exploratory teams. Since most IT organizations have a well-developed immune system against change, formalizing the role of a change agent within the leadership of the IT organization is critical. The change agent must have full executive and technical support, and authority to bring forward change. This is the proper role of the IT function's CTO.

About the Authors

Sonia Bot is an entrepreneurial-minded executive and strategic thinker with extensive experience in technology innovation and global business management. She specializes in new venture creation, product management and delivery, business transformation and strategy, and leading organizational change. She is an accomplished industry presenter, author of numerous peer-reviewed articles, and industry executive member of the Technology Innovation Management Council at Carleton University. Ms. Bot currently provides consulting services by partnering with executives and entrepreneurs of small-to-medium enterprises and large entrepreneurial companies to assist in building, growing, and transforming new ventures and to solve wicked business problems. Her prior work experience includes Research In Motion, Nortel, Bell-Northern Research, IBM, and TransCanada Pipelines. She holds degrees in Computer Science with Systems Design / Electrical Engineering (BMath) from the University of Waterloo and Biomedical Engineering (MASc) from the University of Toronto, and she is a certified Lean Six Sigma Master Black Belt.

Paul Renaud is Chief Executive of The Lanigan Group, which specializes in customer-driven product strategy and business-aligned IT service delivery. He is an advisor to CEOs, CTOs, and CIOs in the technology community and he is a member of industry advisory boards, including Queen's University's Innovation Council for the School of Computing and Ubiquity's Chairman's Advisory Board prior to its acquisition by Avaya. His previous roles include VP Business Intelligence Development at Cognos, Director of Computing & Networking and the Advanced Computing Research Lab at Bell Northern Research, Director of Nortel's Public Network Switching Capacity program and Chief Architect at SHL Systemhouse. Mr. Renaud authored *Introduction to Client/Server Systems*, which was published in four languages and widely used as a university textbook. He has a BSc degree in Computer Science and Mathematics from Queens University.