Process Adaptability in the IT Supply Chain

Paul E. Renaud and Sonia D. Bot

> **"** *If everyone is thinking alike, then no one is thinking.* **"**
>
> Benjamin Franklin (1706–1790)

The continuous pressure to minimize IT costs challenges the IT function to achieve a balance between its own effectiveness and the productivity of the users in the business functions that it serves (i.e., user effectiveness). In many cases, user effectiveness is sacrificed to ensure IT function effectiveness. Process adaptability improves the IT organization's entrepreneurial ability by balancing these conflicting productivity and performance objectives.

This article applies a process-ambidexterity framework to examine how process adaptability in IT is affected by the choice of different strategies for IT Demand Management as well as different fulfillment strategies for IT Supply Chain Management. Alternative fulfillment strategies are presented, along with criteria and indicators that impact IT and user effectiveness that have been applied within major firms.

IT and senior business executives will find this article valuable for helping understand how they can influence the balance between IT and user productivity through their choice of different Demand Management and IT fulfillment strategies. Academic readers will discover that, while process adaptability in IT is an important enabler for implementing dynamic alignment between business and IT function objectives, there may be circumstances where IT process adaptability is not a priority for the business.

Introduction

Entrepreneurship in IT requires processes for managing the IT Supply Chain in a way that adapts to the firm's priorities and does not limit new ways of satisfying business needs. Process adaptability affects the extent to which the fulfillment strategy for the IT Supply Chain is responsive and flexible to meet the changing needs of the firm and enables the IT function to behave as an entrepreneurial entity regardless of whether the firm as a whole might be characterized as mainstream or entrepreneurial.

Balancing the trade-offs between demand and supply is difficult in practice. Building the capability of process ambidexterity within the IT function helps achieve this balance. Process ambidexterity requires disciplined, agile, and lean business management, and it encompasses both process alignment and process adaptability. Process alignment deals with intent, rigour, discipline, consistency, and maturity of the processes. Process adaptability deals with agility, responsiveness, flexibility, and customization of the processes Bot (2012; timreview.ca/article/547).

Bot and Renaud (2012a; timreview.ca/article/596) examined how the concepts of process ambidexterity can be applied to the IT function within a firm. Most IT organizations are primarily focused on the supply chain of technology (*IT Supply*) at the expense of the differences in need for technology across the firm's business value chains (*Business Demand*).

Renaud and Bot (2012b; timreview.ca/article/626) subsequently identified that Business Demand Management is the pivot point for enabling process alignment. From a business alignment perspective, exploratory processes are primarily related to managing Business Demand while exploitative processes are primarily related to managing the IT Supply Chain.

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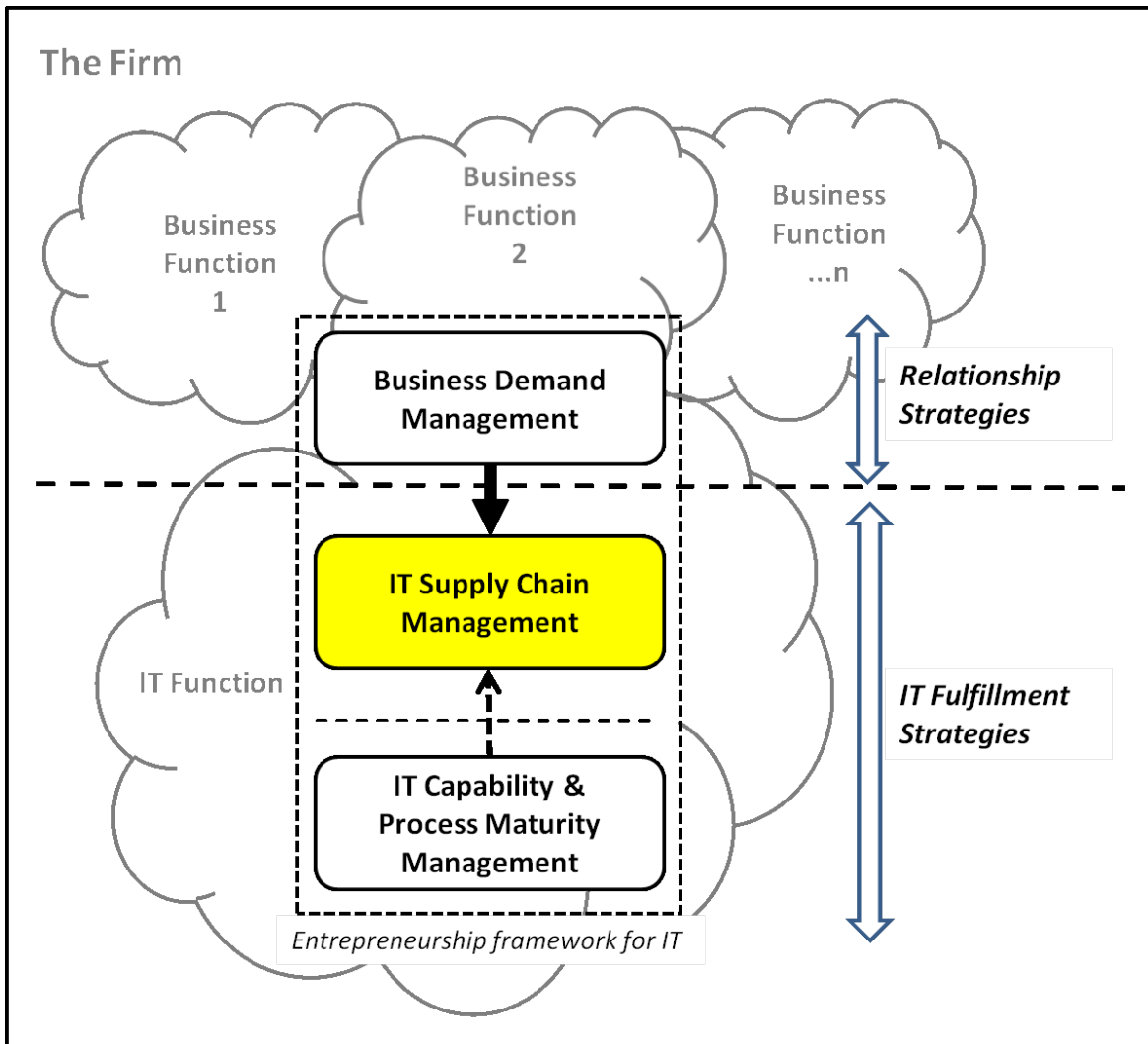*Paul E. Renaud and Sonia D. Bot*

This article uses the process-ambidexterity framework for IT, illustrated in Figure 1, in the context of process adaptability to:

1. Examine how Business Demand Management influences the adaptability and flexibility of the IT function

2. Identify IT Supply Chain Management as a focal component for enabling IT process adaptability

3. Examine process adaptability within the context of four IT fulfillment strategies, as observed in major firms

Process Adaptability in Business Demand Management

Process adaptability in Business Demand Management relates primarily to the relationship between the IT Function and its internal customers within the firm. In practice, this relationship can be characterized along a spectrum from full-service to self-service.

In a full-service relationship, the responsibility for process adaptation falls on the IT function. Usually, infrastructure and facility services are delivered through a full-service relationship because of the significant, long-

*Adapted from Bot and Renaud (2012a; timreview.ca/article/596).

Figure 1. Process-ambidexterity framework for IT*

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term costs involved (not to mention the magnitude of risk in making the wrong decisions). A full-service relationship does not necessarily result in an agile, responsive, or flexible process, however, it is a pre-condition for process adaptability because the IT function assumes responsibility and is accountable for servicing the business.

Historically, most IT-user relationships were full-service until the advent of the Internet. The World Wide Web fostered new economic and technology fulfillment models based on mass customization and self service. Self-service relationships are less costly for the IT function because less is required from them, so self-service relationships have become popular within enterprise IT functions since the late 1990s. In a *self-service* relationship any process adaptation is the responsibility of the internal customer who must be knowledgeable enough to weave together the elements of IT that their business function requires.

As an example, off-the-shelf application software is often purchased or created through a self-service relationship because end-users are typically more intimately aware of their application needs than a central IT function. The IT infrastructure that hosts and runs those applications tends to be a large, fixed cost, which makes it difficult, if not impossible, for an internal customer to introduce new technologies to meet new needs. Mass customization is rarely possible due to the need for IT to control the variety of permissible environments and configurations. The trade-off between control and flexibility is discussed in more detail below.

Between those two extremes, a range of hybrid relationships can be designed by using either a full-service or self-service fulfillment model for each component of the IT Supply Chain Portfolio. For example, facility and data centre space consumption is usually based on a full-service relationship that may be triggered by self-service selection of servers and storage. An internal user needing to install a new application, or expand an existing one, might simply order the type and capacity required through a self-service internal web portal, triggering the behind-the-scenes IT fulfillment process.

The type of relationship between the IT function and its users determines the context for process adaptability. At a contextual level, a self-service paradigm depends on a fixed set of choices being made available to users to choose between. This severely limits process adapt-

ability because the fulfillment processes tend to be optimized around a few alternatives. Meanwhile, a full-service relationship enables the possibility, but does not assure, that IT processes will be adaptable.

At the process level, the processes for *Business Solution Management* and *IT Service Level Management* have the most direct influence on Business Demand Management process adaptability because these are the processes that implement how relationships are managed. These processes are described in more detail by Renaud and Bot (2012b; timreview.ca/article/626).

Process Adaptability in IT Supply Chain Management

An IT Supply Chain consists of the applications, infrastructure, facilities, and technologies used to provide IT for a firm. Managing this supply chain requires an ongoing investment in IT that ideally is aligned to satisfying the needs of the firm. The three major factors that influence process adaptability within IT Supply Chain Management are:

1. Enterprise IT Architecture: the extent to which a "master blueprint" for how all the IT in the firm fits together within a coherent architectural framework greatly determines the extent to which change can be accommodated in a modular fashion without destabilizing other parts of the IT environment.

2. IT Portfolio Management: how the internal portfolio of IT solutions is organized and managed often shapes the range of flexibility that the IT function can provide to the firm.

3. IT Fulfillment Strategy: the trade-off between the extent of control by the IT function versus the degree of business flexibility permitted when accommodating different IT solutions largely limits how adaptable processes can be within IT Supply Chain Management.

Enterprise IT architecture
The ISO/IEC standard 42010 (2007; tinyurl.com/cmtuclf) defines *architecture* as: "The fundamental organization of a system, embodied in its components, their relationships to each other and the environment, and the principles governing its design and evolution." In an IT context, *enterprise IT architecture* refers to the organization of, and interrelationships within, the IT Supply Chain.

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Good architectural principles enable modularity, making it easier for different solutions to be accommodated without cascading complexity into other aspects of the IT infrastructure. The extent to which the IT Supply Chain is well organized architecturally determines the extent to which the IT Supply Chain can accommodate greater diversity in the solutions and technologies that comprise it.

The use of enterprise architecture methodologies such as Zachman (tinyurl.com/4axvn2e) or TOGAF (tinyurl.com/6rxyq8), or the use of service-oriented or cloud-based virtual resource paradigms, facilitates the development of enterprise IT architectures that can promote process adaptability. However, there is no assurance that the resulting architecture will be implemented by using adaptable processes.

IT portfolio management
IT portfolio management is well understood as a capability for managing the return on IT investments (Kaplan, 2005; tinyurl.com/cjz6ghl) under the assumption that the financial return on each investment can be independently evaluated.

Within an IT portfolio, a *horizontal* IT solution delivers a generic or common infrastructure service across all business activities. Examples include email, printing, storage area network (SAN), file systems, database servers, application servers, and web servers. A *vertical* IT solution delivers a specific infrastructure or application service for a single business activity or a set of related business activities. Examples include high-velocity trading and market data distribution.

IT portfolio management favours investments that provide horizontal applicability because the scope for return on IT investment is more limited when considering vertical IT solutions. For example, a horizontal solution has the potential to be used across several business functions to deliver benefits to a broad range of users while the cost to engineer, deploy, operate, and maintain it are simultaneously amortized over a large user base. Hence a portfolio management approach is biased towards horizontal solutions that appear to offer a higher return on investment than a vertical solution that offers benefits to a handful of business functions and whose cost is amortized over a smaller user population.

Horizontal IT solutions do not need IT processes to be as adaptable as vertical solutions because there is less opportunity for variability in the use of the solution by different business functions. However, variation by business function still occurs and should be accommodated if the IT function is to behave entrepreneurially. For example, one business function (such as compliance risk management in a bank) may need a horizontal storage solution optimized for document storage while another business function (such as client account management) may need a storage solution optimized for transactional databases.

A common trap in comparing the return on investment in a horizontal versus vertical IT solution is to not fully account for the hidden end-user costs of using a horizontal solution that may not fit existing business processes as well as a vertically optimized solution would. Hidden costs such as lost productivity, additional data management overhead, and learning costs can skew the return-on-investment calculation. The lack of adaptable IT fulfillment processes often causes these hidden costs to be ignored because a fixed process that delivers a stock horizontal solution is easier for the IT function to implement. The inherent bias needs to be offset by greater process adaptability in the processes that implement portfolio management.

The capability of IT portfolio management is implemented by the processes for *IT Solution and Product Management*, *IT Capacity Planning*, *New Product Introduction*, and *IT Standards Management*. The extent to which these processes are agile, responsive, flexible, and customizable determines the process adaptability of IT portfolio management. Taken together, these processes largely determine an IT function's fulfillment strategy.

IT fulfillment strategies
Different IT fulfillment strategies can be chosen to implement the IT portfolio and the choice of fulfillment strategy often dictates the organizational model for the IT function. The three most common organizational alternatives are:

1. Decentralized: the business functions decide which information technologies to implement. The IT function is distributed under the management of each line of business or major business function of the firm with little to no IT coordination across business functions.

2. Centralized: the IT function is centralized under a single management team, typically reporting to a Chief Information Officer (CIO), whose mandate is to decide how to implement IT and to provide a consistent level of IT service delivery to all aspects of the firm.

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3. Outsourced: one or more external organizations decide how to implement IT. The IT function is externalized under the management of a third party who delivers IT services subject to a contract that defines scope and service level of IT services to the firm.

Weill and Ross (2004; tinyurl.com/ammeuay) identify that creativity and discipline are often in conflict when responding to business needs. Discipline is about architectural control by IT and creativity is about new ways of using IT to make the firm more flexible and effective. This trade-off between the need for increased control by IT and business flexibility becomes more pronounced with the size of the firm. Smaller firms are typically more entrepreneurial and require business flexibility to survive, while the cost of IT can be a significant expense in larger firms.

In practice the IT function will pursue one of the four types of IT infrastructure fulfillment strategies illustrated in Figure 2 depending on how the balance between *control* versus *flexibility* is resolved within any given firm:

1. Decentralized: the IT portfolio is implemented differently in different business units. Process adaptability is generally higher in a decentralized strategy because the IT function is subservient to business functions.

2. Outsourced: the IT portfolio is implemented in a highly standardized manner so that the outsourcing provider can reduce costs. Process adaptability is generally lower in an outsourcing strategy because the range of IT response to any situation is cemented into contracted service levels and subject to contractual scope-change processes that move slowly, if at all.

3. One Size Fits All (Centralized): the IT portfolio is implemented in a highly standardized manner so that the IT function can reduce costs. Process adaptability is generally low in this type of strategy because variability is discouraged by design.

4. Solution Portfolio (Centralized): the IT function provides a customized portfolio to meet the diverse needs of the firm. Process adaptability tends to be higher with this strategy because more degrees of freedom are permitted in the resulting IT portfolio.

Strategies that emphasize greater business flexibility admit higher levels of process adaptability. A full-service relationship that inherently prioritizes vertical needs of business user productivity over horizontal interests of IT
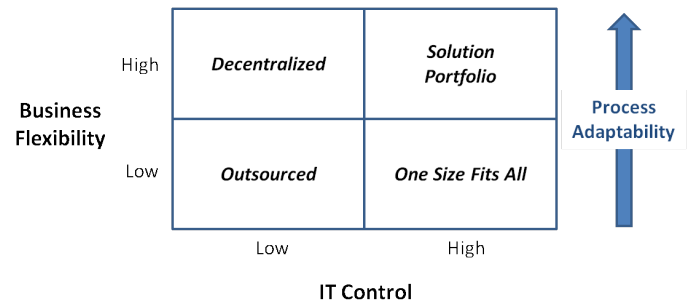
Figure 2. Landscape of IT fulfillment strategies

staff productivity results in a fulfillment strategy found in the top row of Figure 2. Alternatively, a self-service relationship that inherently prioritizes IT staff productivity over business user productivity results in a fulfillment strategy found in the bottom row of Figure 2 and is accompanied by lower levels of process adaptability.

The next two sections discuss these relationships in greater depth by examining how process adaptability (which includes agility, responsiveness, flexibility, as well as customization of processes) varies under different levels of IT control.

Strategies involving low levels of IT control
In firms where any failure to align IT to business priorities is a significant risk to the firm, IT control is not a business priority. These firms will choose a fulfillment strategy found in the left hand column in Figure 2.

In firms where time-to-market is less important, but business alignment is paramount for productivity reasons (e.g., pharmaceutical, healthcare, legal, engineering, and other industries having expensive labour using IT), the IT function is usually decentralized so that each business function can dictate its own IT needs independently from other business functions. This combination results in highly disparate and bespoke IT environments that are optimized for each unit, may be costly, and may not interoperate well, but deliver high levels of IT service flexibility and process customization to users.

In firms where cost control is paramount and IT is a significant expense that has a large impact on operating costs (e.g., firms having low margins in industries such as retail and transportation), the IT function is frequently outsourced as a cost-savings measure to free cash flow for other capital investments. IT process adaptability is not a business priority compared to the importance of maximizing free cash flow.

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In firms where the overriding business priority is time-to-market speed (e.g., firms whose success rests entirely in the digital economy), much of their IT infrastructure and applications may be outsourced to software-as-a-service clouds that provide basic applications (e.g., customer relationship management and accounting). This outsourcing enables the firms to focus their IT investment on the applications that differentiate them as they pursue revenue growth. The remainder of the IT function will typically be decentralized into the business units that depend on that differentiation. In the outsourced aspects, IT process adaptability is low, with little or no flexibility; however, process adaptability is highly specialized or concentrated where it may be needed to deliver differentiated capabilities to the firm.

The combination of low levels of IT control coupled with high levels of business flexibility typically results in higher cost of IT service delivery but this is accompanied by a high degree of process adaptability, which facilitates the perception that IT is more entrepreneurial and worth the extra cost.

Firms choosing the combination of low IT service levels coupled with lower level of business flexibility (due to an emphasis on controlling the cost of IT) will end up with low levels of process adaptability due to fixed service levels provided by largely inflexible outsourcing arrangements. In these firms, an entrepreneurial IT function is not necessarily desirable, particularly if IT is not considered to be strategic to business differentiation (e.g. mining, metals, oil and gas extraction, and industries having high capital costs outside of the IT function). The loss of IT process adaptability in such firms is inconsequential compared to other business priorities.

Strategies involving high levels of IT control
Many firms drive down the cost of IT by giving the IT function a mandate to implement centralized control over permissible IT products and technologies (usually referred to as *IT standardization*). Fewer solutions to manage reduces IT costs by making IT personnel more productive – often at the expense of end-user productivity as illustrated in the upper portion of Figure 3. A high degree of IT standardization ultimately results in a *One Size Fits All* approach in which the pursuit of IT function productivity is paramount. Given that differences in need by business function can rarely be accommodated by a single standard and any process adaptation is perceived as costly from the perspective of optimizing

IT staff productivity, a *One Size Fits All* strategy reduces process flexibility and customization.

The distinguishing feature of the *One Size Fits All* fulfillment strategy is that it is applied without regard to differences in need across business functions by implementing the entire IT portfolio with a set of horizontal products (e.g., file storage and database storage). The IT Portfolio Management process, by design, results in a single investment for each horizontal IT product need.

However, several US investment banks have discovered that it is possible to broaden their *One Size Fits All* approach by using a *Solution Portfolio* fulfillment strategy that balances the inherent trade-off between IT function and business function productivity as illustrated in Figure 3. In a *Solution Portfolio* fulfillment strategy, the IT function may deliberately invest in more than one implementation for each horizontal solution with the goal of achieving a better and more responsive fit to commonly recurring vertical needs across business functions. This strategy inherently applies process adaptability to improve responsiveness and flexibility. For example, some business activities such as ticker data management, may require a database solution optimized for non-transactional streaming of millions of serial trading records, while other business activities, such as trade execution, require a database solution optimized for a much smaller number of concurrent transactions.

As illustrated by the trade-offs in the lower portion of Figure 3, an *IT Solution Portfolio* fulfillment strategy can balance both user and IT staff productivity. Limiting the portfolio of IT solutions to a handful of business-aligned variations for each horizontal need enables the IT function to exercise control and reduce costs via standardization without disregarding differences in needs between different business activities. This results in a higher level of process adaptability.

Firms that have a centralized IT function using a *One Size Fits All* strategy for IT fulfillment can improve process adaptability and increase business flexibility by evolving to *Solution Portfolio* strategy. The challenge is how to select and manage the IT Supply Chain portfolio to minimize horizontal duplication while simultaneously balancing the need to be responsive to different vertical business needs. Renaud and Bot (2012b; timreview.ca/article/626) determined that employing exploratory processes for Demand Management is one way to meet this challenge.

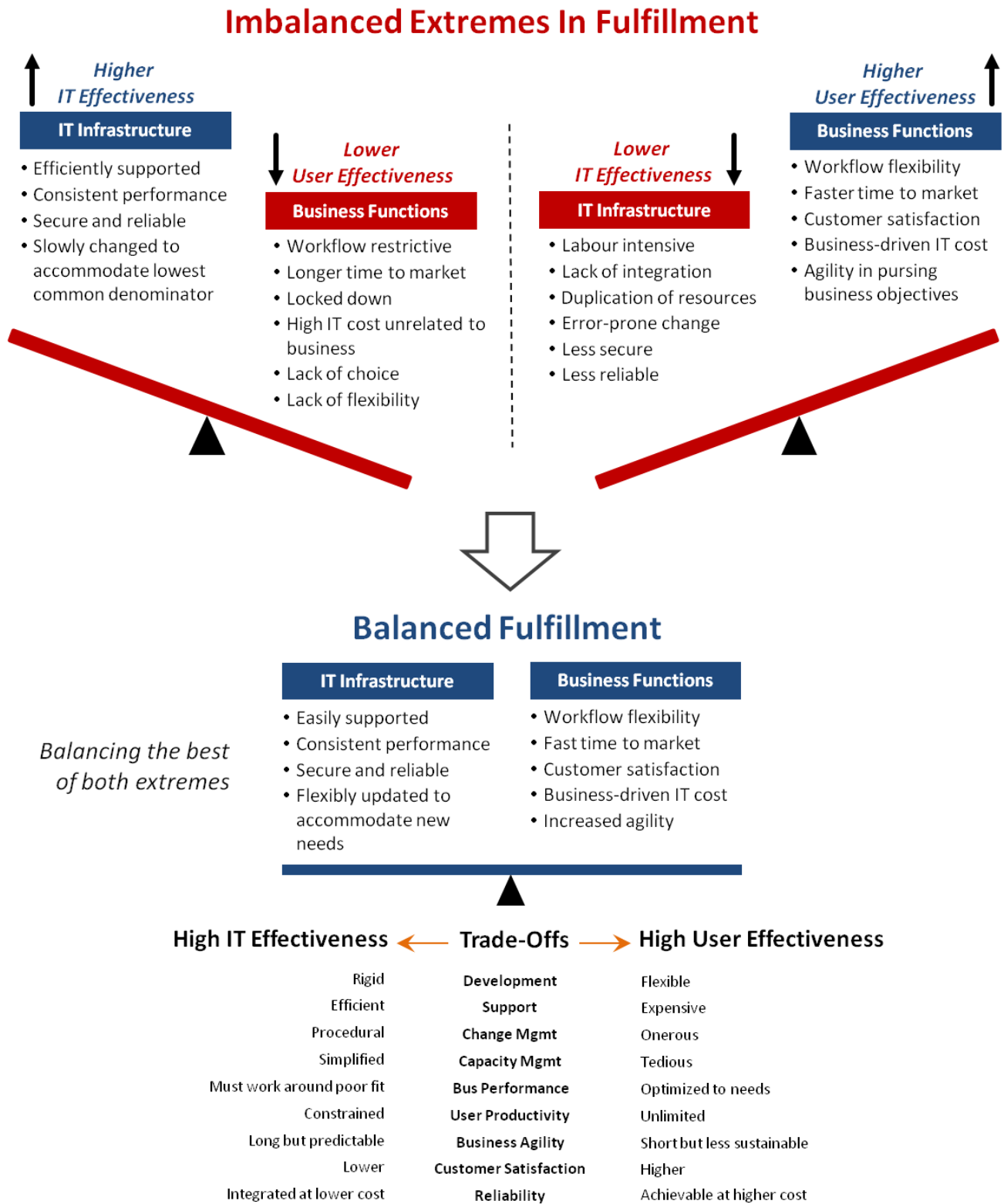# Process Adaptability in the IT Supply Chain
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Imbalanced Extremes In Fulfillment

↑ Higher IT Effectiveness

IT Infrastructure
- Efficiently supported
- Consistent performance
- Secure and reliable
- Slowly changed to accommodate lowest common denominator

↓ Lower User Effectiveness

Business Functions
- Workflow restrictive
- Longer time to market
- Locked down
- High IT cost unrelated to business
- Lack of choice
- Lack of flexibility

↓ Lower IT Effectiveness

IT Infrastructure
- Labour intensive
- Lack of integration
- Duplication of resources
- Error-prone change
- Less secure
- Less reliable

↑ Higher User Effectiveness

Business Functions
- Workflow flexibility
- Faster time to market
- Customer satisfaction
- Business-driven IT cost
- Agility in pursing business objectives

Balanced Fulfillment

Balancing the best of both extremes

IT Infrastructure
- Easily supported
- Consistent performance
- Secure and reliable
- Flexibly updated to accommodate new needs

Business Functions
- Workflow flexibility
- Fast time to market
- Customer satisfaction
- Business-driven IT cost
- Increased agility

High IT Effectiveness ← Trade-Offs → High User Effectiveness

High IT Effectiveness	Trade-Offs	High User Effectiveness
Rigid	Development	Flexible
Efficient	Support	Expensive
Procedural	Change Mgmt	Onerous
Simplified	Capacity Mgmt	Tedious
Must work around poor fit	Bus Performance	Optimized to needs
Constrained	User Productivity	Unlimited
Long but predictable	Business Agility	Short but less sustainable
Lower	Customer Satisfaction	Higher
Integrated at lower cost	Reliability	Achievable at higher cost

Figure 3. Balancing trade-offs between IT and business function productivity

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Conclusion

This article makes several contributions:

1. The relationship strategy chosen for Business Demand Management can either enable or limit IT process adaptation but does determine it. The decision to implement a self-service model essentially trades off user productivity to improve IT productivity. Conversely, a full-service model trades off IT function productivity to improve end-user productivity. The choice of relationship strategy will also influence which IT fulfillment strategy is most feasible to pursue.

2. IT Supply Chain Management is the focal point for enabling process adaptability. Improving the adaptability of these processes is necessary to accommodate greater diversity within the IT portfolio. Greater diversity is supported by modular or service-oriented enterprise architecture and generally results in a better fit between IT and the needs of the business.

3. The type of IT fulfillment strategy chosen can have a significant bearing on an IT function's ability to implement process adaptability. While different fulfillment strategies for IT Supply Chain Management may be pursued in firms whose overriding business priorities trump the importance of IT process adaptability, a portfolio-based fulfillment strategy is generally the best option for promoting process adaptability.

Process alignment and process adaptability comprise the key components of process ambidexterity. A companion article (Renaud and Bot, 2012b; timreview.ca/article/626) presents a process alignment framework for IT. Together, these pave the way for growing the capability of process ambidexterity, and in turn improve the performance of the IT and business functions, and the firm overall.

Acknowledgements

About the Authors

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.

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