

Strategic Information System Agility

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Strategic Information System Agility: From Theory to Practices

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INVESTOR IN PEOPLE

In loving memory of my aunt Essadia Sahid
In loving memory of my mother
To my family

Abdelkebir Sahid
Yassine Maleh
Mustapha Belaisaoui

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List of Acronyms

AM	Agility Management
APO	Align, Plan, and Organise
BAI	Build, Acquire, and Implement
BSC	Balanced Scorecard
ISO/IEC	International Standards Organization/International Electrotechnical Commission
CEO	Chief of Enterprise Officer
CG	Corporate Governance
CIA	Confidentiality, Integrity, and Availability
CIO	Chief of Information Officer
CMDB	Configuration Management Database
CMMI	Capability Maturity Model Integration
COBIT	Control Objectives for Information and related Technology
COSO	Committee of Sponsoring Organizations of the Treadway Commission
DOI	Diffusion of Innovation theory
DSS	Deliver, Service, and Support
DIS	Direction of information systems
DBPA	Data Base Agility Drivers
EDA	Exploratory Data Analysis
EDM	Evaluate, Direct, and Monitor
EUROSAI	European Organization of Supreme Audit Institutions
EIS	Enterprise Information Systems
ERP	Enterprise Resources Planning
DSR	Design Science Research
EG	Enterprise Governance
IT	Information Technology
ITG	Information Technology Governance
ITGI	Information Technology Governance Institute
ITIL	Information Technology Infrastructure Library
ITSM	Information Technology Service Management
IS	Information Systems
SLA	Service Level Agreement
ISO	Information Security Officer
ISMS	Information Security Management System
ISG	Information Security Governance

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ISSP	Information Systems Security Policy
ITIL	Information Technology Infrastructure Library
ISACA	Information Systems Audit and Control Association
JIT	Just-in-Time (manufacturing philosophy)
KPI	Key Performance Indicator
MEA	Monitor, Evaluate, and Assess
MENA	Middle East and North Africa
NIST	National Institute of Standards and Technology
OLA	Operational Level Agreement
OA	Organizational Agility
PDCA	Plan-Do-Check-Act
PCM	Process Capability Model
PMBOK	Project Management Body of Knowledge
PSIS	Policy Security for Information Systems
SLM	Service Level Management
SMEs	Small and medium-sized enterprises
SOX	Sarbanes-Oxley Act
SPOC	Single Point of Contact
TQM	Total Quality Management
TQC	Total Quality Control
VE	Virtual Enterprise
UTAUT	Unified Theory of Acceptance and Use of Technology

Preface

In the last decade, the use of information systems as a strategic tool has contributed significantly to the Information Technology revolution. However, the adoption of information systems is rarely successful without adequate precautions and attention. IT systems' deployment is both a risky and profitable choice for an increasingly rapid and evolving economic context.

Nowadays, organizations increasingly require a reactive and proactive response to uncertain internal and external events and opportunities, demonstrating agility of action to reach a company's operational performance. The issue is that organizations are generally not prepared to deal with significant uncertainties and unpredictability. Likewise, information systems are not developed to cope with change and unpredictability. Consequently, for many companies, IT signifies a constraining factor to business agility requirements.

Strategically, agility implied conquering new markets, taking risks, and considering new social and environmental challenges. Thus, in operational strategy, this means integrating stakeholders into the company's practices and improving its understanding by re-evaluating all links in chain value to create a competitive advantage.

In other words, agility necessarily requires strategy and, more specifically, organization, culture, and business model to convey the need for responsiveness as effectively as possible.

Faced with the various transformations, and needs of the internal and/or external environment, it is essential to structure the company's information system (EIS) to facilitate its evolution and modify its positioning, structure, and skills. All this in harmony with the company's strategic development, while ensuring global consistency in terms of permanent IT alignment with the global strategy, interoperability, integration, autonomy, and flexibility. In other words, the EIS must be agile.

The book's purpose is to analyze and explain the impact of IT systems' strategic agility on organizations' business performance in response to highly uncertain and unexpected events potentially significant.

The present book aims to create an explanatory framework that illustrates how and under what conditions IT helps organizations to detect and respond to uncertain events supported by learning capabilities. The main question of this book is the following: What is the role and impact of strategic IS agility on the operational agility of organizations in response to uncertain events?

This book delivers comprehensive coverage of the elements necessary for the development and the implementation of effective Information systems' strategic

agility. The book dissertation includes the concept, theory, modeling, and architecture of an agile information system. It covers state of the art, concepts, and methodologies for developing information system strategies taking into account the environment, the current development of information technologies, and the general trend of IS agility. The book should help companies to formulate the information systems' processes of the twenty-first century to grow in the competitiveness of its area.

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Chapter 1

Introduction

1.1 Context

Nowadays, managers increasingly require a proactive and reactive response to uncertain internal and external events and opportunities, demonstrating flexibility and agility of action to match the company's operational performance. The issue is that organizations are generally not prepared to deal with significant uncertainties and unpredictability. Usually, business practices were certain and predictable (Kidd, 1995). Likewise, information systems are not developed to cope with change and unpredictability. Consequently, for many companies, information technology (IT) is a significant factor that constraints business agility requirement.

A study by Tucci, Mitchell, and Goddard (2007) shows that less than half of chief executive officers' CEOs trust IT to contribute to the success of their business. An MIT study of 1,500 IT managers shows that 71% of American companies are in phase 1 or 2 of enterprise architecture maturity (Ross & Beath, 2006), which explains why IT is a barrier to business agility in many organizations.

The lack of agility hurts the company's performance, for example, due to delays in the launch of new products. Thus, according to Foster and Kaplan (2001), a six-month delay in the product launch in the pharmaceutical and cosmetics industry has decreased the product's turnover by more than 30% over its lifetime. Another example is General Electric's plan to save \$10 billion with real-time information in its GE cockpits for monitoring the company's performance and rapidly adapting to changes required (Melarkode, From-Poulsen, & Warnakulasuriya, 2004).

There are significant differences between companies' ability to detect uncertain and unexpected events in different sectors of activity to react quickly by changing their operations and business processes. With this quality, the company can cope with surprising and unavoidable changes by expanding (or reducing) these specific capacities or reducing cycle times beyond current levels of flexibility (Sengupta & Masini, 2008).

These two examples highlight the benefits of IT in improving responsiveness and agility. This book analyzes the role and impact of IT agility on operational agility to help organizations deal with uncertain and unpredictable consecutive events.

Today, agility has become a necessary quality, especially in an always unstable economic environment, making it mandatory, even indispensable (Conboy, 2009; Imache, Izza, & Ahmed-Nacer, 2012; Sharifi & Zhang, 1999; Zhang & Sharifi, 2000).

Likewise, IT agility has become the primary purpose of any information systems' department, a quality that any company must have, to meet the customers' needs, face competitiveness challenges and rapid technological evolution.

Faced with the various transformations and needs of the internal and/or external environment, it is essential to structure the company's information system (EIS) to facilitate its evolution and modify its positioning, structure, and skills. All this in harmony with the company's strategic development, while ensuring global consistency in terms of permanent IT alignment with the global strategy, interoperability, integration, autonomy, and flexibility. In other words, the EIS must be agile.

1.2 Why Agility Now?

The following chapter introduces the topic and provides an overview of the research contributions included in this book. We ask, "Why agility now?" We believe there are at least three answers. First, it is becoming increasingly difficult to survive and succeed in today's business environment. Being agile, able to detect and react to predictable and unpredictable situations is a promising strategy in times of change and uncertainty. Recently, an essential activity on agility has promoted in the form of agile software development, agile manufacturing, agile modeling, and agile iterations. The diffusion of IT is a process that takes time and effort. Many IT projects succeed in developing a product, but fail to achieve goals. The importance of information systems' agility for rapidly changing business environments was recognized, particularly in the digitalization age. In this field, agility refers to the ability to provide solutions promptly and to adapt quickly to changing requirements.

For a long time, the business environment has been relatively stable, with gradual changes. In the event of a radical change, the rate tends to remain relatively slow without being quickly followed by other significant changes.

In this relatively stable environment, organizations were not encouraged to be proactive in their response to internal and external events promptly. More specifically, as a communication and transaction infrastructure, the Internet has caused (and will continue to create) turbulence and uncertainty in business and consumer markets, as well as its ability to connect everyone and everything.

Changes and events in the economic environment were generally predictable. Nevertheless, technology, innovation, public policy changes, and deregulation are destabilizing the business landscape and redesigning this world (Hagel & Brown, 2003).

Friedman (2005) argues that the twenty-first-century globalized world has flattened the world. Radical "non-linear changes," leading to a different order are becoming more frequent. Moreover, the pace of change is significantly faster. Business-networks are becoming more sophisticated and interconnected. The boundaries of the industry are becoming blurred (finance, media, telecoms, and IT converge) (Bradley & Nolan, 1998). However, re-intermediation has created new stakeholders with new capacities, delivering new services to end clients.

Regulatory changes and external requirements for accountability, sustainability, and security have a significant impact on the products, processes, and

organization's resources. To maintaining its competitiveness and perseverance over time, a company must be able to detect uncertain events, react quickly, and learn from experience (Dove, 2002).

Agility gives organizations the ability to quickly detect and respond to unpredictable events, and meet changing customer demands. This ability is essential in today's business world.

New technologies and business practices are continuously introduced to create or change global market demands (Sengupta & Masini, 2008).

Two examples illustrate this. An example to understand the role of agility is the agility of IT services' companies, which was challenged during the latest financial crisis in 2008. When "IceSafe" Bank, an Icelandic bank, encountered financial problems, its customers no longer had access to their savings' accounts over the Internet from one day to the next, which caused a major panic among IceSafe and other bank customers in Europe. Consumers are seeking assurance that their funds are always safe and accessible through the Internet. The "IceSafe" bank's website and account information were no longer accessible to customers, consequently a traffic spike on other banks' websites. IT firms that provide IT hosting capacity and maintenance services for banks such as "IceSafe" should react quickly to maintain online banking services for their customers.

Another example is Volvo's sales and IT initiative to manage the development and implementation of an agile supply chain in the aftermarket. Volvo has developed a platform, web services and a web portal for selling spare parts on the Internet. Indeed, the difficulties related to the creation and the integration of a new platform are accentuated by the pressure of establishing new relationships in the field of global logistics for Spare Parts. Volvo's work illustrates agility by continuously working on scenario development and ensuring that projects are deployed correctly to support learning.

In the "Icesafe" Bank example, using intelligent agent software helps IT service firms by allowing them to identify a possible disruption of their web hosting services proactively. As a result, a response process was initiated to avoid a possible online banking suspension.

Through these two examples, IT can improve IS responsiveness and agility.

1.3 The Agility Role

Companies must increase their reactivity levels to cope with globalization and various internal and external challenges. Flexibility allows reactivity into organizations, processes, and systems, on a limited number of measures only. Except for that combined flexibility in a system, from the beginning, becomes costly.

A new concept is needed to survive in a turbulent environment and cope with market changes.

This concept, called agility, was introduced in the American automotive industry in the early 1990s. The Department of Defense requested that Lehigh University researchers develop a vision, a conceptual framework, and recommendations to create an effective industrial infrastructure. As a result of this work, the report entitled "21st Century Manufacturing Enterprise

4 *Strategic Information System Agility*

Strategy” (Nagel & Dove, 1991) was published by the Iacocca Institute at Lehigh University (Kidd, 1994). Following this first report, the Agility Forum is created to explore the agility concept in more depth.

Agile manufacturing was developed as a new manufacturing paradigm to address customer requirements in volatile markets. Agile Manufacturing incorporates the full range of flexible production technologies, the lessons learned from total quality management, “just-in-time” production, and “lean” production (Goldman, 1994).

Goldman and Nagel (1993) defined agility as the ability to succeed in a continually changing and unpredictable competitive environment and to react quickly to unforeseen changes in global markets, where demand for low-cost, high-performance, high-quality products, and services is paramount for customers.

Several publications on agile manufacturing and agile enterprises (Dove, 2002; Kidd, 1994, 1995) followed the work of Goldman and Nagel (1993) and Goldman, Nagel, and Preiss (1995). Subsequently, the concept was extended to supply chains and business networks (Mason-Jones & Towill, 1999; Swafford, 2004; Towill & Christopher, 2002; Van Hoek, Harrison, & Christopher, 2001; Yusuf, Gunasekaran, Adeleye, & Sivayoganathan, 2004). Recently, many researchers have analyzed how IT can support business agility and how agility can improve information systems performance (Desouza & Awazu, 2006; Sambamurthy, Bharadwaj, & Grover, 2003).

IT constitutes a key business agility asset and a significant capability that can hinder or facilitate business agility. Over the years, IT has considerably developed and achieved considerable maturity to optimize the use of limited and costly technological resources, roles and relationships have been defined (Hagel & Brown, 2001). IT has become standardized and shared knowledge through the years, reducing prices due to economies of scale.

The literature presents three research streams with different perspectives on the relationship between IT capabilities and organizational agility (performance). According to the first trend, IT capacity is not essential and does not hinder the company’s agility performance. The other view is that IT capabilities contribute to strengthening the company’s agility (performance). For the third stream, IT capabilities contribute to improving the company’s agility (performance), but under certain limited conditions and circumstances. This doctoral book will provide additional research resources related to the third stream.

1.4 IT as a Business Agility Obstacle

For decades, many studies have revealed conflicting, sometimes divergent, results regarding IT’s effects on the organization’s responsiveness and flexibility. In a survey of many business process re-engineering cases, Attaran (2004) found that “IT was the main obstacle to rapid and radical change, with the profound transformation of the IS requiring a redesign of the IS.” Cabled IT architectures, where business rules are incorporated into information systems, are a significant obstacle to rapid change. IT departments in large companies seem unresponsive and lacking in agility (Kearney et al., 2005). Among the main barriers to this unreliability are existing information systems, the excessive complexity of the IT architecture, and

the reduced interaction between the company and IT; (flat Business-IT alignment) moreover, differences between Top Management and IT managers regarding the importance of IT and the appropriate time for new technology adoption.

IT infrastructure and application complexity prevents the rapid development and deployment of new systems to support business agility.

1.5 IT at the Service of Business Agility

IT can increase organizational agility through open standards-based information systems (which facilitate transformation between partners), involving the best functional areas and being flexible for change, due to lack of time, and low costs (Klapwijk, 2004). IT agility increasingly promotes business adaptability (i.e., business agility). Automation has moved from the back office (the 1980s) to the front office (the 1990s) to the automation of the IT infrastructure's ability to adapt to each business decision. Also, functional (vertical) IT architectures are replaced by horizontal (Large-enterprise) designs.

Over the decades, IT protectionists and vendors have developed concepts and strategies to assist companies in achieving IT and organizational agility. As a result, a variety of organizational models and agile IT solutions were designed to reach business agility and cope with unexpected changes. In the research, many books and papers were addressed the information technologies' role to promote organizational reactivity.

The purpose is to have an agile organization able to configure IT and human resources in a fast and flexible way to detect and respond to evolving demands, through the IS capacity in general and the IT infrastructure in particular (Pearlson & Saunders, 2006).

Today, CEOs increasingly recognize the importance of being agile, proactive, or reactive – in responding to internal and external uncertain events and opportunities. However, the challenge is that organizations are generally not designed to cope with severe uncertainty and unpredictability. Economic practices are founded upon certainty and predictability (Kidd, 2000). Also, information systems are not intended to deal with changes and unpredictability.

1.6 Research Objective

The objective of the book is to create an explanatory framework that illustrates how and under what conditions IT helps organizations to detect and respond to uncertain events, supported by learning capabilities. The principal research question of this book is:

Which are the role and impact of IT systems' strategic agility in responding to uncertain events?

Table 1 presents an overview of the sub-research questions in this study and the chapter(s) in which they are addressed.

Table 1. Research Questions.

Research Question	Chapter Number
How to achieve agility in Enterprise Information Systems?	4
How does agility impact IT service management?	5
How can cloud computing adoption increase IT agility?	6

1.7 Research Design

The research plan for this book consists of two Sections. The first section includes an in-depth literature review and analysis of existing case studies in Chapters 2 and 3. The result is a global research model. In the second section, a general analysis of the concept of agility is conducted in different industries and sectors based on the worldwide research model. It will be the subject of Chapters 4 and 5.

1.8 Contributions and Relevance

This book aims to serve the scientific and business community. The contributions will allow knowing how IT can improve business agility. Promote understanding of the relationship between IT service management agility and organization responding to uncertainty in the agile era.

As a practical contribution, this book purposes providing managers with an overview of events requiring agility, in which conditions IT should assist the organization to respond and learning, to leverage personal and organization capabilities through practice frameworks to reach agility in IT asset and service information systems, management, and strategic. Results should allow decision-makers to determine perspectives, face compromises, and manage IT to drive Information systems' strategic agility.

As applied research, this study attempts to help address the strategic gap in IT agility that has been identified as a significant, real, global problem. In highlighting the “know and do” gap underlying this study, we have tried to tackle this problem boldly. Research overcomes some challenges in researching new areas of corporate governance and IT agility. The foundations have been laid for industry and scholarly literature in this field to contribute to knowledge.

This book makes the following significant contributions to IT agility in the literature:

- The first contribution of this research is the literature review on IT agility. It is clear that while there is significant literature on IT agility and its forms, there is a shortage of literature on IT agility and the importance of internal and external factors on IT investment decision-making.
- The second contribution is identifying essential aspects that define the agile practical framework for IT service management ITSM. It was gathered from a theoretical and empirical research study that generated answers to secondary level research questions and feedback from the analysis of best practice experience in organizations.

- The third contribution identifies the determinants of cloud computing adoption based on the characteristics of innovation and the technological, organizational, and environmental contexts of organizations, and assesses how cloud computing is changing IS agility.

1.9 Book Organization

The overall structure of the book is described in Fig. 1. Chapter 2 presents a review of research related to agility by analyzing the different types of the research proposed, from the craft industry to the emergence of agility. Chapter 3 presents an overview of information systems' evolution based on three inter-dependent phases. Chapter 4 gives a combination illustrating the development of agility within information systems and provides a conceptual framework to adopt agility in the organization's information systems. Chapter 5 proposes an agile IT service management through a case study in a large organization. The proposed framework will impact all aspects of IT-oriented user productivity

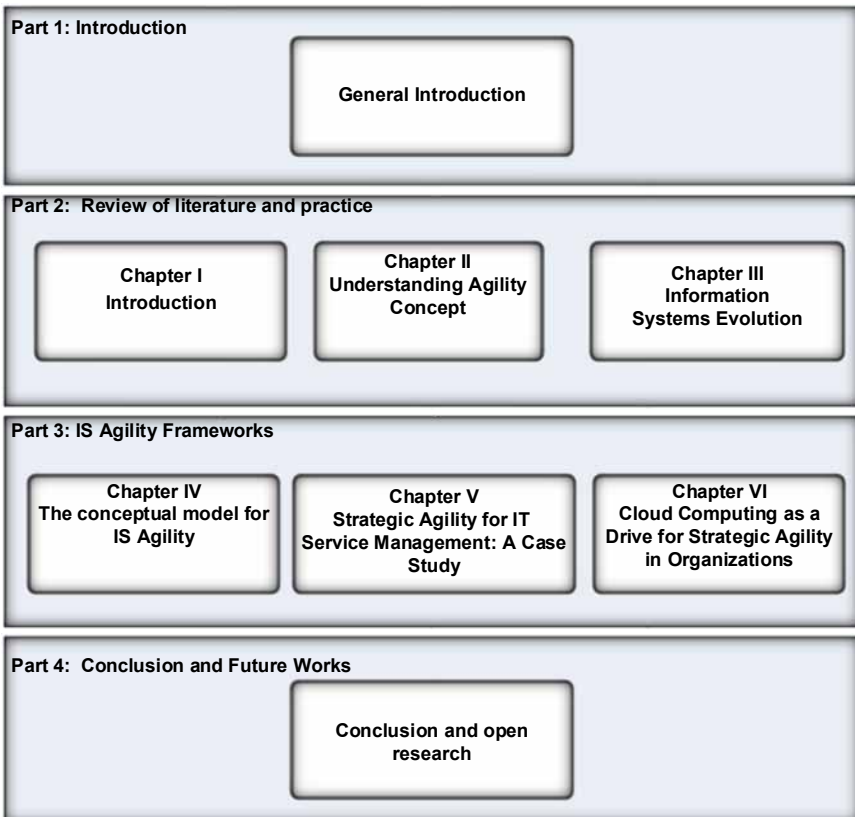


Fig. 1. The Overall Structure of the Book.

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and will implement an agile approach to managing all these aspects. Chapter 6 proposes recommendations on when and how cloud computing is a useful tool and outlines the limitations of recent studies and future research perspectives. Its primary objective is to explore how agility influences decision-making to adopt cloud computing technology, and how the cloud can increase IT agility. A survey was conducted in the Middle East and North Africa region covering medium and large organization from the manufacturing and service industries.

Finally, we discuss the key findings of this book, the limitations, the contributions to the academic and the business world and some recommendations for future research.