



EDITORIAL

Business agility and diffusion of information technology

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While agility has recently attracted considerable attention in studies of systems development and management of information technology (IT), there is limited recognition within the information systems discipline of the important impact agility has already had on organizational studies in general. The extensive literature on agile development approaches has, for example, few or no links to the considerable literature on organizational agility that has developed since the Agility Forum was founded at Lehigh University in 1991 (Dove, 2001). The purpose of this special issue is to bridge this gap and to create a strong foundation for continued studies of the relationship between business agility and the diffusion of IT into organizational contexts. We believe this to be a timely purpose as organizations rebalance their IT infrastructure and portfolio of IT innovations in preparation for the future.

Business agility

Business agility is a relatively new paradigm painted as a solution for maintaining competitive advantage during times of uncertainty and turbulence in the business environment (Sharifi & Zhang, 2001). An agile mind is defined by Merriam-Webster online (2005) as having a quick, resourceful, and adaptable character. So, agile organizations respond quickly, they are resourceful, and they are able to adapt to their environment.

Quickness is about the speed with which the organization can respond to customer requests, market dynamics, and emerging technology options. This includes the time to sense relevant events, the time to interpret what is happening and assess the consequences for the organization, the time to explore options and decide on which actions to take, and the time to implement appropriate responses (Haeckel, 1999). Resources are about the capabilities that are available within the organization including people, technology, processes, and knowledge. Resources can be both tangible and intangible and they provide the basis for doing business and for instantiating change (Haeckel, 1999). Adaptability is about how well the organization responds to changing demands, threats, or opportunities. This requires the ability to learn as well as flexible processes and products that can be reconfigured without extensive additional costs (Haeckel, 1999; Dove, 2001).

Agility is concerned with economies of scope, rather than economies of scale (Dove, 2001). Where lean operations are usually associated with efficient use of resources, agile operations are related to effectively responding to a changing environment while at the same time being productive. The idea is to serve ever-smaller niche markets and individual customers without the high cost traditionally associated with customization. Agile organizations are not only capable of successfully implementing change; they are nimble, capable of responding quickly and gracefully to both expected and unexpected events in their environment. The

concept of agility arose from flexible and lean manufacturing (Kidd, 1995; Dove, 2001), and has been quickly adopted by organizations producing software in the form of agile systems development (Aoyama, 1998; Cockburn, 2001).

Diffusion of IT

It seems patently obvious that the diffusion of IT-based innovations (Rogers, 2003) plays a crucial role in shaping business agility. The ability to quickly change the type and flow of information within an organization must underlie a rapid and graceful reorganization. But there is a gap between the IT function and the rest of the organization. This gap, called the IT paradox, reflects how top management sees the value of an effective IT operation and infrastructure, but lack an understanding of how IT essentially contributes to business value (Morgan, 2004).

The IT paradox has grown more critical in the wake of frenzied spending on IT driven by the Y2K and dot-com imperatives. The subsequent economic downturn drove fundamental re-examination of organizational investments in IT. During periods of economic growth, organizations may drive forward IT projects with some disregard for how these align with the rest of the organizational IT portfolio. In such a period, the IT paradox is less of a problem. In the subsequent downturn, however, organizations reflect on the unbalanced IT infrastructure that emerges from the disregarded portfolio. During this latter period, the focus of many projects is on stabilizing the IT infrastructure rather than developing new competitive advantage. As a result, organizations are balancing their IT spending, seeking to become better positioned (more agile) in preparation for the next economic expansion (Leidner *et al.*, 2003). Not surprisingly, the globalization of the IT workforce is one aspect of this economic and infrastructure repositioning (Hoffman, 2003).

Closing the gap between the IT function and the rest of the organization requires that the IT strategy is aligned with business goals and practices (Henderson & Venkatraman, 1993; Reich & Benbasat, 2000). An IT-strategy may consist of (1) a vision – an ambitious and attractive picture of the future and IT's role in that future, (2) a mission – why is IT adopted in this organization, (3) technical policies, that is on data, systems and IT infrastructure, and (4) organizational policies, that is on roles, responsibility, workflows or business processes, and how to organize the IT function. The diffusion and adoption of the IT-strategy is also crucial, for example, in deciding which activities (projects) to start. Agility comes into play when crafting the business strategy and aligning it with the IT strategy. How can one set up strategies for becoming more agile? How can one envision being agile in the future? Also, how agile is the organization in adapting the IT strategy when, for example, a new business opportunity causes changes in the business strategy?

The product or service of some organizations is itself an IT artifact or IT-based. In these cases, the business strategy will be about IT and the focus will be on the relationship between IT or systems development and business agility (Börjesson & Mathiassen, 2005). This introduces the factors upon which systems development agility depends, such as refactoring, pair programming, and planning games, along with techniques for building it. Quite a lot of research has focused on the practical problems of developing software in agile ways. Some techniques seem to work well in practice, while others have proven less universal.

The special issue

A natural question to ask is, 'Why agility now?' We believe there are at least three answers. First, it has become still harder to survive and be successful in today's business environment. However, being agile and being capable of sensing and responding to both predictable and unpredictable events holds promise. Agility has therefore been promoted in the form of agile systems development, agile manufacturing, agile modelling, and agile iterations. Second, IT diffusion is known to be a process that takes time and effort. Numerous are the IT projects that succeeded in developing a product but failed in changing the behaviour of the target group. Diffusion just did not happen. Therefore, agile IT diffusion is sought-after. Third, the importance of flexibility in developing IT solutions for rapidly changing business environments is well recognized especially for internet applications (Pries-Heje *et al.*, 2004). Here, agility refers to the ability to quickly deliver IT-based services and quickly adapt to changing requirements.

This special issue provides a rich and coherent picture of state-of-the-art research on business agility and IT diffusion. The papers were selected and developed based on the IFIP Working Group 8.6 conference held in Atlanta in May 2005 (Baskerville *et al.*, 2005). From an original pool of 42 submissions to the conference, 18 were selected for presentation based on a formal review and revision process. Subsequently, we asked the authors of the best papers, based on the discussions at the conference, to develop their research further. In addition, we provided them with guidelines that would lead towards our vision of a coherent special issue. This select group of revised and improved papers then went through a new round of reviews and revisions resulting in the seven papers published in this special issue.

The many contributions to the IFIP Working Group 8.6 conference (Baskerville *et al.*, 2005) and the discussions at the conference suggest a simple roadmap to studies of business agility and IT diffusion as illustrated in Figure 1. First, some researchers investigate agility issues on the firm-level. Other researchers investigate agility issues related to specific processes, for example, systems development or supply chain processes. Second, some studies focus on IT as enabler of business agility and emphasize broad organizational measures of performance. Other

Firm-level analysis	Overby, Oosterhooft	Borjesson
Process-level analysis	Holmquist, Hovorka	Lyytinen, Fitzgerald
	Organizational performance: IT as enabler	Technology performance: IT as service

Figure 1 A Roadmap to Business Agility and IT Diffusion.

studies focus on the agility of processes that delivers IT-based services and such studies emphasize more specific measures of performance related to technology. Hence, the contributions in this special issue represent different approaches to the study of business agility and IT diffusion as illustrated in Figure 1.

Overby, Bharadwaj and Sambamurthy: enterprise agility and the enabling role of information technology

This conceptual paper presents a firm-level analysis of how IT can enable enterprise agility. The authors define and deconstruct enterprise agility by relating it to similar concepts in the literature, for example dynamic capabilities, market orientation, absorptive capacity, and strategic flexibility. Based on the fundamental distinction between the sensing and response components of enterprise agility the authors offer foundational building blocks for a research program on enterprise agility and the enabling role of IT.

Oosterhout, Waarts and Hillegersberg: change factors requiring agility and implications for IT

This empirical study constructs a framework for measuring current *vs* required levels of business agility on the firm-level. The framework was used to survey four industry sectors in the Netherlands. The survey suggests that today's businesses lack the agility required to quickly respond to changes that are difficult to predict. Another major finding is that legacy systems are hindering business agility. Based on the empirical findings, the paper discusses principles and directions that can be used to transform IT into an enabler for increased agility.

Holmquist and Pessi: agility through scenario development and continuous implementation: a global aftermarket logistics case

This case study paper from Volvo, Sweden, examines the development and implementation of an agile aftermarket supply chain on the process-level. Volvo wanted to create a Web platform including a Portal and Web Services to sell spare parts over the Internet globally. The paper describes how scenarios and iterative continuous implementation were used to achieve business agility in this global supply chain effort, for example, by organizing each intervention in a way that made it possible to nurture learning. The contribution of the paper lies in the process-level analysis of how continuous implementation

and scenarios can be combined to enable improved organizational agility.

Hovorka and Larsen: enabling agile adoption practices through network organization

This paper presents a process-level analysis of how a network organization environment influences the ability to develop agile IT adoption practices. Based on an exploratory case study, the authors investigate the interactions between network structure, social information processing, homophily, and absorptive capacity. They find that agile adoption practices are based on an organization's ability to acquire, assimilate, transform, and exploit knowledge, and that this ability can be increased through strong and dense networks. They also examine how social communication networks can influence adoption practices. For example they find that having strong and dense communication networks can facilitate knowledge flows and increase the chance of successful adoption. The authors offer on that basis a model of agile IT adoption practices.

Börjesson, Martinsson and Timmerås: agile improvement practices in software organizations

This paper reports an action research study at Ericsson, Sweden. The paper provides a firm-level investigation of the gap between the intended user population and the actual users. This diffusion gap is bridged using a so-called guerrilla tactic that implements agile improvement practices. The contribution of the study is that the guerrilla tactic supports agile improvement practices and facilitates successful implementation.

Lyytinen and Rose: information system agility as organizational learning

This paper offers a process-level analysis of agile development seen from an organizational learning perspective. The authors develop a theoretical model of how and why systems development agility is influenced by the organization's focus on exploration and exploitation. Based on their learning focus, organizations make choices on how the speed of development is related to other goals including quality, cost, risk, and innovative content of the project in question. The theory is validated by investigating changes in systems development organizations' process goals and innovation practices over a period of 4 years.

Fitzgerald, Hartnet and Conboy: customising agile methods to software practices

This case study paper presents a longitudinal, process-level study of the use of agile methods – eXtreme programming (XP) and Scrum – at Intel, Ireland. XP and Scrum practices were carefully selected and tailored to suit the needs of the development environment. The agile practices that were applied did lead to significant benefits, including reductions in code defect density by a factor of seven and projects delivered ahead of schedule.

The contribution of the paper is to show that careful adoption of agile software practices at the process level

can lead to significant improvements in technology performance.

About the authors

Lars Mathiassen is Georgia Research Alliance Eminent Scholar, Professor at the Computer Information Systems Department and co-Founder of The Center for Process Innovation at Georgia State University. His research focuses on development of software and information services, on IT-enabled innovation of business processes, and on management and facilitation of organizational change processes. He approaches innovation and improvement initiatives with a strong focus on people skills and collaborative processes while at the same time emphasizing adoption of state-of-the-art technologies and methods. He has published extensively in major information systems and software engineering journals and has co-authored several books on the subject including *Professional Systems Development*, *Computers in Context: The Philosophy and Practice of Systems Design*, *Object Oriented Analysis & Design*, and *Improving Software Organizations: From Principles to Practice*. He is one of the co-founders of *Scandinavian Journal of*

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