Strategic Agility—Integrating Business Intelligence with Strategy

Marko Kohtamäki and Donald Farmer

Introduction

In search of knowledge to improve competitive advantage, and as a result of the low cost of storage and the rapidly growing use of data-rich applications, firms are collecting and storing more information than ever. In many cases, the usefulness of this stored data is unclear, but typically business strategists hope to acquire knowledge to improve competitive advantage in rapidly changing competitive landscapes. Thus, the question of the development, utilization, and implementation of the knowledge acquired has become particularly relevant. As a former director of Nokia said succinctly: "Five to ten years ago, you would set your vision and strategy and then start following it. That does not work anymore.

M. Kohtamäki (✉)
University of Vaasa, Vaasa, Finland
e-mail: mtko@uwasa.fi

D. Farmer
TreeHive Strategy, Woodinville, Washington, USA
e-mail: donald.farmer@treehivestrategy.com

M. Kohtamäki (ed.), *Real-time Strategy and Business Intelligence*,
DOI 10.1007/978-3-319-54846-3_2

Now you have to be alert every day, week, and month to renew your strategy" (Doz and Kosonen 2008a, b: 95). Even Nokia, despite probably recognizing the urgent need for change, ended up being trapped by its past capabilities, and as a result failed to renew its mobile phone business line. As such, the Nokia case exemplifies how in rapidly changing business environments where companies have to adapt effectively, the capacity to collect data, assimilate knowledge, and implement strategic decisions should be a central concern, at least that is the doctrine of strategic agility, also known as fast strategy. Perhaps Jon Kapan, VP of US sales and operations at Google, provides a good example when emphasizing the importance of agility to modern companies in 2015, stating that "We have to be agile. As you think about the businesses that we are in and how the company has changed over the last 10 or 15 years, it's totally different today than when we started. So we have to have leaders, we have to have employees, and we have to have technology that is all very agile for where the industry is going" (McKinsey & Company 2015: 1). A different issue is whether companies have the dynamic capabilities required to effectively renew and reconfigure their resource base (Eisenhardt and Martin 2000; Teece 2007).

Organizational flexibility is said to facilitate organizational independence, innovation, competitive advantage (De Leeuw and Volberda 1996), and company performance. Instead of simply selecting where to focus, companies need to decide which games to play to ensure the organization keeps learning and transforming to avoid being trapped by its past success (Sirén et al. 2012). A central concern of a technology company should be its capabilities, and it should be addressing which to expand upon to avoid the arrogance that can be an unwelcome by-product of continuous success. As Brown and Eisenhardt (1997: 2) state:

> In these industries, the ability to change continuously is a critical factor in the success of firms. In addition, what is also becoming apparent is that this continuous change is often played out through product innovation as firms change and ultimately even transform through continuously altering their product.

In this work, strategy is defined as a shared mindset and organizational actions to achieve competitive advantage (Agarwal and Helfat 2009).

Accordingly, when manifested in the actions of organizational members, strategy provides the necessary guidelines on where and how transformation in the company is happening. This form of strategy is seen as one evolving over time as the company adapts to its competitive landscape.

The concept of adaptation is hardly new. For decades, studies have described the concepts of an adaptive strategy, a flexible organization, an organic organization, agility, organizational learning, absorptive capability, and strategic learning. However, these concepts were mostly developed before large-scale digitization, the internet, and the internet of things, and therefore do not cover the opportunities presented by digitization, and nor did they foresee the enabling role (and the complications) of information technology. For instance, neither the strategy process nor the strategy-as-practice literature has yet fully addressed the influence of information systems on strategy work (Whittington 2014). The same can be said of the research relating to management information systems and decision support systems (DSS), which mostly neglects the existing strategy research. Research on DSSs tends to have a rather technological emphasis and to neglect the parts of organizational life—the products, services, and order-delivery processes—where the strategy is manifested. As Clark et al. (2007: 580) state:

> There have been calls for a new theory of management decision support that focuses on a broader context than does the traditional DSS to include business processes, organizational members, technology, infrastructure, and organizational outcomes from using the systems.

The fact that the existing research on strategy and business intelligence, despite some emerging exceptions, does not provide the frameworks, practices, or tools necessary for real-time strategic decision making has given rise to a call for the development of a new theory.

Accordingly, this chapter and this book as a whole concentrate on developing a framework of real-time strategy to guide top and middle management. Combining the research streams on dynamic capabilities and agile strategy, business intelligence, strategy processes, and strategy-as-practice, the current chapter intends to create new ideas of near-real-time strategic management, which are here described as agile strategy. As information systems "increase an organization's agility or

its capabilities 'to sense and respond to predictable and unpredictable events' (Baskerville et al. 2005, p. 3)" (Hovorka and Larsen 2006: 162), and as the existing literature does not provide frameworks capable of integrating the business intelligence (BI) and strategic agility literature to the required extent, theory and framework development is needed. As such, digitization, the internet of things, and big data analytics provide an excellent opportunity to develop a theory of strategic agility to facilitate strategic renewal in technology firms.

Theoretical Grounds

Building on the grounds of emergent strategy and business intelligence, the present work intends to develop the concept of real-time strategy by building on strategy-as-practice, organizational renewal, and management information systems literature. Strategy work is approached from the strategy-as-practice, planning, and emergence perspectives as well as that of fast strategy. Aligned with the classic Minzbergian idea, we consider that "strategy formation walks on two feet, one deliberate, the other emergent" (Mintzberg and Waters 1985: 271). As such, we see strategy as what managers and companies do, rather than what companies have (Whittington 2006; Jarzabkowski 2008; Vaara and Whittington 2012). Hence, our definition and understanding of strategy build on the strategy-as-practice approach. Moreover, we want to emphasize the idea of strategy as simple rules and concur with Eisenhardt and Sull (2001) in thinking that strategy should ultimately be simplified into a few guidelines that have a steering effect on organizational practice.

Secondly, we approach this topic of real-time strategy from the perspective of organizational renewal, which includes dynamic capabilities, absorptive capacity, and agile strategy. These perspectives view strategy as a process of organizational renewal that can be divided into knowledge absorption and resource reconfiguration. In addition, agile strategy is a perspective that has emerged in the strategy literature suggesting that companies should be agile and adaptive to changes in the business environment. Hence, strategic decision making is approached as

emergent strategic learning, where a modern corporation continuously invents and reinvents its strategy, while selecting targets, measures, processes, and resources. In addition, a noticeable and increasingly significant element of change in the business environment is the greater data literacy of younger employees and the development by software vendors of user experiences focused on a self-service approach to data analysis. We consider the impact of these developments on strategic planning and point to the dynamics of self-service in strategy-as-practice as a direction for future research.

Thirdly, this paper builds on knowledge management, which we define here through management information systems, DSSs, and business intelligence. While we acknowledge the role of BI technologies in the knowledge management process, the main focus here is on the interplay between strategic practices and BI technologies. Figure 1 synthesizes the theoretical concepts utilized in this article.

Fig. 1 Real-time strategy building on established concepts

Dynamic Capabilities

As a broader, umbrella concept, the strategy literature uses dynamic capabilities, which refers to a firm-level renewal enabled by the capacity to reconfigure processes, systems, and resources. More precisely, dynamic capabilities are often delineated as a "firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (Teece et al. 1997: 516). Further, "dynamic capabilities can be disaggregated into sensing, seizing, and transformational activities" (Teece 2007: 1344). According to Winter (2003: 91), if a capability to change is to be interpreted as a dynamic capability, the capability for renewal and reconfiguration must be deeply embedded into organizational routines; thus, ad hoc problem solving would not constitute a dynamic capability. The literature that identifies the characteristics of companies with dynamic capabilities cites issues such as high relative share of R&D investments, and the number and significance of new patents (e.g., patent citations) over time. Other important characteristics highlighted include an ability to expand into new business, product, and service areas profitably, and a capacity to effectively develop new ecosystems and utilize partnerships and strategic networks. Given these characteristics, developing dynamic capability is no easy feat for a firm. Consider Google for instance, the firm maintains high levels of R&D investment to back its growth into new business areas, but still derives its biggest revenues and profits from advertising. Certainly, despite the challenges of making profits in new, far-reaching business areas, Google could be considered a company with the capability for renewal and reconfiguration, and as one of the most successful innovators around; Google also exemplifies a corporation with dynamic capabilities. Reflecting the main ideas of firm renewal, the dynamic capability literature concentrates on a firm's capacity to reconfigure resources when the market environment is changing. There has been less focus on a firm's ability to reconfigure when the resources available are themselves changing, as with the increasing data literacy and self-service capabilities described above.

The aspects central to the dynamic capability view include strategic renewal, organizational learning, absorptive capacity, and strategic learning. Examining the link between renewal and organizational learning,

Crossan et al. (1999: 522) stated: "Organizational learning can be conceived of as a principal means of achieving the strategic renewal of an enterprise." Learning has long been at the center of organizational renewal and change. Prior studies apply the constructs of absorptive capacity, organizational learning, and strategic learning almost interchangeably. Whereas absorptive capacity emphasizes the outside-in process, organizational learning concentrates on the learning process within the company, and strategic learning—building on Minzberg's (Mintzberg and Lampel 1999; Mintzberg and Waters 1985) work on strategic emergence—highlights the strategic role of learning (Kuwada 1998; Sirén et al. 2012). Learning can be seen as a central mechanism within strategic emergence, where strategy is formed in everyday actions, where strategy is what the organization does, and where strategy is developed through incremental and radical steps and is something lacking precise planning (Burgelman 1991; Kuwada 1998; Mintzberg and Lampel 1999). Alternatively, a path-dependent strategy based on incremental learning may also create organizational inertia (Burgelman 1991), as the existing and historically acquired competencies cherished by the organization can create a learning trap. In that case, incremental, exploitative development constrains effective adaptation to environmental changes, and the organization becomes trapped by its past success, history, and developed competencies, and processes, as highlighted by Andy Grove (Intel's then CEO) in Burgelman's (1991: 251) interview:

> Don't ask managers, "What is your strategy?" Look at what they do! Because people will pretend….The fact is that we had become a nonfactor in DRAMs, with 2–3% market share. The DRAM business just passed us by! Yet, in 1985, many people were still holding to the self-evident truth that Intel was a memory company. One of the toughest challenges is to make people see that these self-evident truths are no longer true.

This may resonate with Nokia following the corporation's experience of being trapped by its commitment to the Symbian operating system and the cheap-smartphone market. Table 1 highlights the definitions applied in prior studies.

Table 1 Concepts of organizational learning, absorptive capacity, and strategic learning as defined in the prior literature

Authors	Concept	Definition	Dimensions
Crossan et al. (1999)	Organizational learning	The 4I framework of organizational learning contains four related (sub)processes—intuiting, interpreting, integrating, and institutionalizing—that occur over three levels: individual, group, and organization. The three learning levels define the structure through which organizational learning takes place. The processes form the glue that binds the structure together; they are, therefore, a key facet of the framework. (p. 524)	Intuiting Interpreting Integrating Institutionalizing
Zahra and George (2002)	Absorptive capacity	ACAP as a set of organizational routines and processes by which firms acquire, assimilate, transform, and exploit knowledge to produce a dynamic organizational capability. (p. 186)	Knowledge acquisition Knowledge assimilation Knowledge transformation Knowledge exploitation
Sirén et al. (2012)	Strategic learning	Defines strategic learning as an organization's dynamic capability, consisting of intraorganizational processes for the dissemination, interpretation, and implementation of strategic knowledge (p. 19)	Knowledge dissemination Knowledge interpretation Knowledge implementation

The ideas in the present chapter draw on the concept of absorptive capacity, combining the content of absorptive capacity with knowledge management (or management information systems) and strategy-as-practice. For absorptive capacity, we utilize the model developed by

Zahra and George (2002) utilizing four phases of knowledge absorption: acquisition, assimilation, transformation, and exploitation. To benefit from *knowledge acquisition*, an organization needs to decide on the purpose for which the data are collected and choose the measures to be used to collect the data. Despite the amounts of data being collected, organizations are not always clear on what to do with all the information they acquire. The literature on absorptive capacity highlights the scope of such a knowledge search and portrays how an organization might refer to its strategy to define that scope. Without a clear strategy and measures, an organization can end up collecting data without purpose and consequently be unclear about what to do with it. For the purpose of business intelligence, we suggest a framework that could build on the dimensions and measurements of the framework presented in Fig. 3 (The business intelligence framework).

Knowledge assimilation concentrates on the interpretation, comprehension of, and learning available from the collected data. Hence, in this phase an organization gains an understanding of those observations made from the objects of study. Here, we include the data analytics, organizational interactions, and sensemaking that enable the organization to understand and attach the new data to the existing knowledge structures, thus providing material for decision making and enabling decisions to be made. The *knowledge transformation* phase focuses on turning knowledge into new decisions, activities, and investments. In this phase, knowledge is developed or transformed into concrete forms that can aid the implementation of product, service, or process development initiatives. In the final phase—*knowledge implementation*—knowledge is stored, and decisions are implemented. The implementation takes the form of the launch of new products, services, processes, and systems, and their utilization in the market. Studies highlight the importance of following up the achievement of strategic targets and rewarding staff for their achievements.

Strategy Work

As the assumption of continuous company renewal strengthens, the borders between the strategic, the tactical, and the operative can be seen to

be diminishing somewhat. The literature concerning the process through which strategies are formulated is developing through three stages and schools: strategic planning, strategy processes, and strategy-as-practice. For the planning school (Andrews 1971; Ansoff 1965), strategy is very much forward looking, involving rigid planning processes, and is something implemented by strategic analysts and programmers. Strategic planning is seen as close to programming, being based on careful analysis, decision making, and implementation. The boundaries between analysis, decisions, and implementation are clearly defined and the rational, planned strategy is mainly thought of as an issue concerning the top management. Its critics accused the planning school of almost killing strategic planning as we know it (Mintzberg 1994; Taylor 1997), although this may have been an exaggeration at the time (Vaara and Whittington 2012). Since the 1970s, the strategy process school has moved the thinking on strategy formulation toward less bureaucratic forms. The strategy process literature brought an emphasis on strategic adaptation, staff participation, and to a lesser extent, strategy implementation, with quantitative analysis (Hutzschenreuter and Kleindienst 2006). The process school also highlighted the role of environmental changes and organizational adaptation. A sub-stream of literature considered strategy as contingent on the environment (Burgelman 1991) and had earlier suggested that the structure should follow the strategy (Chandler 1962). The environment-strategy-structure fit, therefore, requires a simplified model to express the basis of this interplay. Accordingly, illustrating potential components in the dimensions of the business environment, company strategy (e.g., Porter 1980), and value system organization (e.g., Williamson 1985), this chapter provides a contingency theoretical framework (Lawrence and Lorsch 1967) to consider the potential configurations of the environment-strategy-structure fit (see Fig. 2). While stopping short of offering a universally applicable explanation of how organizations should make decisions in certain circumstances, the framework does enable an organization to consider potential combinations of components, and it also illustrates how strategic agility facilitates the search for the optimal environment-strategy-structure configuration. The list of components utilized in Fig. 2 is not exhaustive by any means, but a collection of well-established concepts to frame and convey the main idea of the approach.

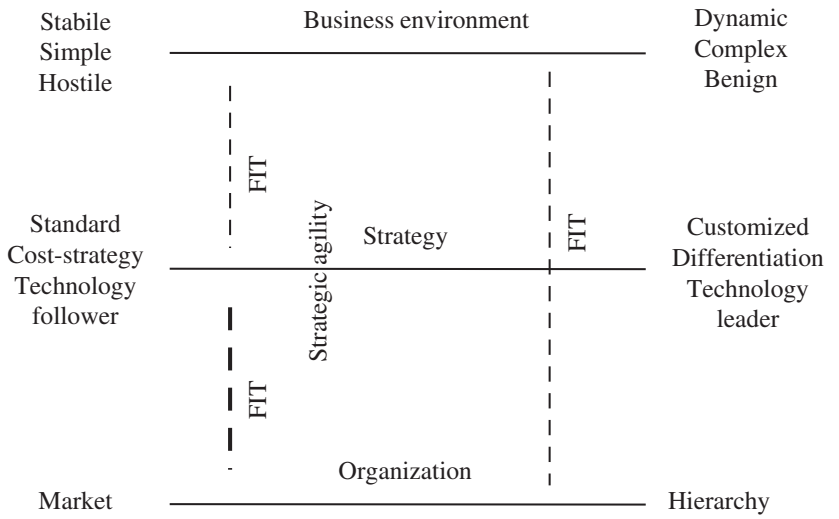

Fig. 2 Environment-strategy-structure fit

Finally, extending and challenging the research in the strategy process tradition, strategy-as-practice, have concentrated on the micro-level practices of strategy, emphasizing the role of practitioners, practices, and praxis. Strategy-as-practice emphasizes the role of middle managers in strategy work, while also directing attention to the strategic work conducted by individual managers. These studies can be useful from the perspective of business intelligence and information systems in that they explore how managers and management teams use information systems in strategy work.

The Concept of Strategic Agility

Prior research has utilized several different concepts that establish the ground of the discussion on company renewal (Agarwal and Helfat 2009; Volberda et al. 2001). Those concepts include agile strategy (Doz and Kosonen 2008a, b), fast strategy (Doz and Kosonen 2008a, b; Eisenhardt 1989), strategic flexibility (Evans 1991), strategic learning

Table 2 Definitions of strategic agility and related concepts

Author	Concept	Definition
Brueller et al. (2014)	Strategic agility	Strategic agility as the capacity of making knowledgeable, nimble, rapid strategic moves with a high level of precision
Fredericks (2005: 558)	Strategic flexibility	…is initiated in response to market opportunities and changing technologies (Sanchez 1995) that have a significant impact on firm performance
Fredericks (2005: 558)	Operational flexibility	…the ability of an organization to deal with short-term fluctuations in demand, labor and raw materials shortages, or equipment failure
Johnson et al. (2003)	Market-focused strategic flexibility	Market-focused strategic flexibility is a firm's dynamic resource-based capabilities derived from resource identification, acquisition, deployment, options identification, and recognition
Yuan et al. (2010: 301)	Strategic flexibility	…firm's capability to identify changes in the environment, to quickly commit resources to new courses of action in response to changes, and to act promptly when it is time to halt or reverse such resource commitments
De Leeuw and Volberda (1996: 134)	Flexible organization	Flexible organization asks for a willingness to shift, flex and change, and at the same time for an unconditional commitment, concern, and loyalty to the organization

(Sirén et al. 2012), absorptive capacity (Cohen and Levinthal 1990; Zahra and George 2002), and organizational learning (March 1991). These concepts have been applied in a variety of contexts, such as at the firm (Sambamurthy et al. 2003), relationship (Huikkola et al. 2013), or supply chain level (Hoek et al. 2001). Table 2 provides a series of definitions of the concept of strategic agility and the related concepts. The concept of strategic agility itself seems to be applied in a vast range of research, spanning that on strategic management (strategic agility, strategic flexibility), information systems (agility, flexibility of information systems), organization (Strategic flexibility, organizational agility),

marketing (strategic adaptability, strategic flexibility), and production management (agile manufacturing strategy, manufacturing flexibility). Although the concept of strategic agility has been advanced by different disciplines, the main emphasis remains unchanged—the need to react to the changes in the market environment. Where strategy, marketing, and organizational studies emphasize a firm's capacity to identify market changes, and the assimilation and implementation of knowledge, the production economics approach tends to highlight the flexibility of manufacturing systems and agile manufacturing. The literature on IT systems highlights their role in facilitating flexible order-deliver processes.

As strategy is formulated and reformulated through organizational decisions and actions, it is constantly changing and is thus adaptive. New strategy tools and facilitating information systems should be developed over time to implement strategic agility throughout the organization. Business intelligence systems might provide answers to the question of strategic agility, if organizations learn how to effectively utilize such systems.

The Concept of Business Intelligence

Today's firms are more data driven than ever before, because the Internet facilitates more effective collection, development, and utilization of data. For instance, Google, one of the iconic companies of the age of digitization, defines its decision making as being centrally data driven:

> We're a data-driven company. At Google, you really don't walk into a meeting talking about your gut feel on something. You need to have the data to back it up. And so data is another key tenet of what's made our decision making really successful. (Jon Kaplan, VP, US Sales and Operations, Google; McKinsey & Company 2015: 1)

The information systems that support management in making decisions have given rise to several expressions adopted in recent studies. Those terms include knowledge management, business intelligence, man-

agement information systems, DSSs, executive information systems, and knowledge management systems. Here, business intelligence is understood as deriving from a DSS that stores, analyzes, and communicates information to guide top and middle managers and management teams in their strategic decision making. Information systems provide storage, processing, and communication power, which can be utilized in the development of strategic knowledge.

Typical BI systems intend to (1) provide a single view of an organization, (2) facilitate communication, and (3) facilitate organizational development (Ramakrishnan et al. 2012). The mechanisms through which the information system produces positive outcomes have been modeled simply, disclosing the necessary moderators as contingencies: system quality → information quality → use → user satisfaction → individual impact → organizational impact (DeLone and McLean 1992).

However, more recently, BI systems have in practice moved to facilitate a self-service approach, enabled in large part by user experiences that bring within the reach of non-specialized business users previously complex problems of modeling metadata, data transformation, and complex aggregation that were strictly in the domain of the Information Technology department. Although this change has attracted little formal research, the market dynamics are already clear and appear to be driven by greater user satisfaction. Firms still face the challenge of moderating either a single view of the organization or finding a method suitable for resolving contrasting, or even contradictory, views developed by individual self-serving users. Nevertheless, despite the significant changes in practice that this new approach involves, the key driver for adoption of these systems remains the development of tactical and strategic decision making and collaboration, driven by data. With regard to the scientific terms, very little is known about the interplay between information systems and strategy, that is, what types of micro-practices are utilized with information systems. These fields of research, such as DSSs, and strategy do not seem to have any interaction.

Figure 3 presents a framework for business intelligence suggesting the dimensions that might be utilized when collecting, assimilating, transforming, and exploiting data to support decision making in a top

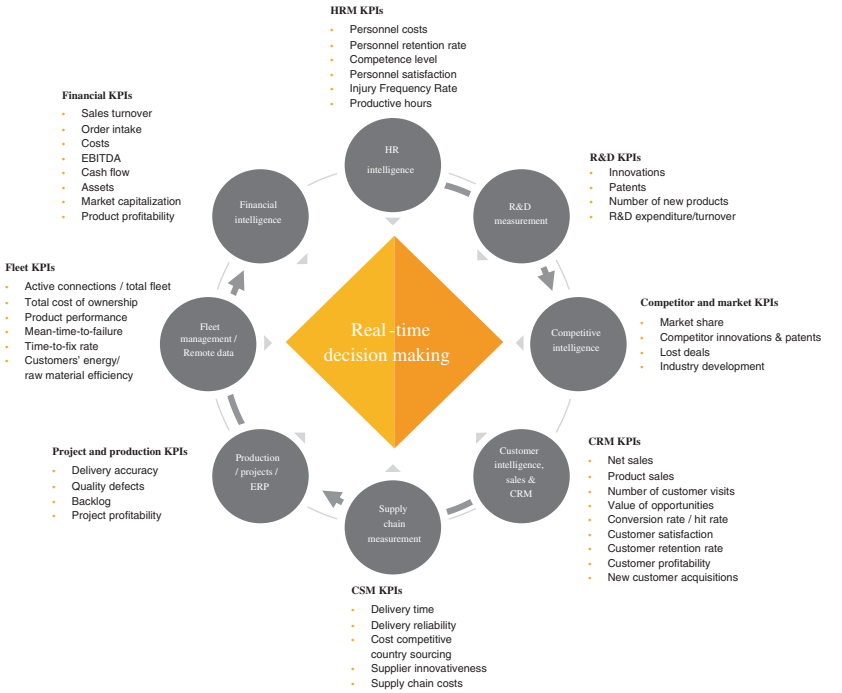

Fig. 3 Business intelligence framework

management team and at a middle-management level. Reflecting the core functions in a technology company, the framework provides measures for different dimensions, such as finance, customer relationship management (CRM), competitive intelligence (CI), R&D, production systems, supply chain management (SCM), human resource management (HRM), and fleet management. The figure uses the dimensions to provide an overview of the scope of decision making, and the applied measures, suggesting that these measures could be used for target setting, follow-up on strategic initiatives and implementation of investments, and setting reward policies by the management team. The framework presented can serve as a tool for real-time strategic management. Each dimension in the figure integrates some main measures used by the case companies studied when developing these frameworks.

Moreover, the framework should prove useful for middle management, who could use the knowledge collected by these measures to manage a department.

Aligning Strategic Practices and Bi Technologies

The existing literature on strategic agility portrays strategy as closely related to absorptive capacity, which provides a central process for business intelligence, because business intelligence is about the effective utilization of external and internal knowledge for decision making and implementation. The process of business intelligence, that involves collecting, extracting, transforming, and loading data (ETL) for data mining and analysis, is strongly influenced by the practices related to strategy work. Hence, as illustrated in Fig. 4 below, we intend to align

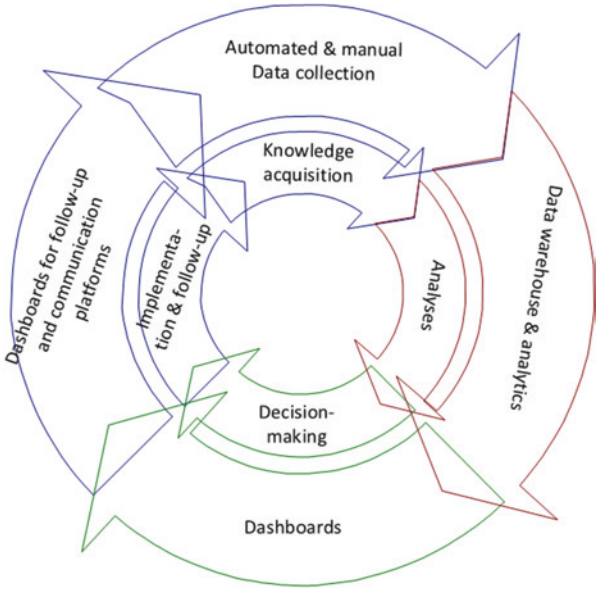

Fig. 4 Aligning strategic practices and BI technologies

Table 3 Alignment between strategic practices and BI technologies

Knowledge creation process	Enabling practices	Enabling technologies
Knowledge acquisition	Decide on measures and frameworks Design data collection Use frameworks to collect data Use both qualitative and quantitative data Collect variety of information Store the data	Data sources (external data sources, internal databases)
Knowledge assimilation	Share knowledge within the organization Provide access for a variety of managers Develop knowledge further maintaining the links to raw data	Extract, transform and load Data warehouses
Knowledge transformation	Develop collected knowledge Utilize knowledge for decision making Utilize knowledge for product/service development Transform knowledge into new ideas	Online analytic processing Dashboards Spreadsheets
Knowledge exploitation	Provide implementation activities and schedule for the organization Lead the knowledge implementation through interactions Provide the required targets and support	Complex event processing engines Dashboards Spreadsheets

the strategic practices (inner circle), and the facilitating BI systems—so-called enabling BI technologies (outer circle). These are clarified further in Table 3.

Firms need all the complementary capabilities to support successful knowledge absorption. The search for competitive advantage may be limited by the organizational inertia emerging from the path dependency of the organization. As important as organizational capabilities are, they may turn into core rigidities, limiting the organization's ability to adapt to changes in the environment. Sometimes companies are trapped

by their past success or resources and become incapable of un-learning and removing organizational learning traps (Sirén and Kohtamäki 2016). Thus, most organizations are somewhat limited by their past as well as the capacity to absorb and utilize knowledge. Table 3 illustrates how strategic practices and enabling BI technologies are aligned.

Directions in User Experience and Future Developments

Two of the most significant changes in the business environment for business intelligence are the increasing data literacy of a new generation of employees and the trend toward self-service user experiences in commercial software. In the past, only IT departments could deploy the expensive storage and computing power needed for effective analytics. Indeed, only IT understood the technical issues and, very importantly, only IT could secure the data and the resulting analysis to ensure the right people had the right insights.

In truth, there was always a dark side to this model. When developers struggled to manage the analytics life cycle quickly enough for agile businesses, business users simply used spreadsheets as a merely adequate tool, often copying or exporting from reports for further analysis. In such cases, there was no shared view of the organization, no agreement on key measures, and no formalized schedule of implementation or testing. As a result, although information collection and knowledge sharing happened in practice, weak analyses or even sharing of confidential data could proliferate in the wings of an organization. It was also difficult for organizations to realign with knowledge acquired and shared in this way, as there was no formal paper trail enabling a structured review of the data behind decisions or the strategic effectiveness of choices made.

More recently developed self-service BI technologies are now in the mainstream of enterprise analytics. These tools primarily use visualization to enable users to find patterns and communicate insights easily and effectively. In-memory storage brought data handling and computing power to the desktop that was once only available in the carefully

managed server room. While these tools are within reach of many business users, more data-literate employees may find they have a significant advantage in agile decision making (and therefore agile strategizing) through the use of these tools and their consequent ability to build persuasive, data-driven arguments.

In practical terms, we should first recognize that the classic BI architectures we have described will still deliver *mission-critical decision support*. For example, the enterprise data warehouse, with its consolidated metadata model, will be with us for year-on-year consolidated financial reporting, tax analysis, human resources analysis, and other well-defined, strategic analysis. In this model, IT provides the full life cycle of analytics. Administrators secure the systems, offering data access as needed and as permitted. IT departments, in short, take on a serious role as gatekeepers.

In the self-service environment, IT departments may move from being gatekeepers to being something akin to shopkeepers. A gatekeeper aims to keep the wrong people out, while a shopkeeper invites the right people in, preparing, presenting, and provisioning their goods to encourage appropriate use. In IT terms, a data provisioning team can rapidly and effectively build models designed for business users to serve themselves from. Rather than opening the gate to give users access to source systems, a functional team can instead provision data out toward the users: cleaned, consolidated, and even anonymized as necessary for effective analysis and good governance. In this model, what the IT function does not need to do is to prepare every source for a specific use: the business analysts use their own tools—perhaps even according to personal preference—to help themselves to those solutions. IT monitors the use of these models and, with the help of automation, can iterate new sources, extensions, and enhancements with greater agility compared to having to rebuild the entire analytic supply chain for every change.

In this supply chain model, where the IT function acts akin to a shopkeeper, it still plays the major role in ensuring compliance. Its oversight responsibilities include managing the deployment, user permissions, server performance, and scaling of the self-service environment. But IT must also understand what data sources analysts use, who they

share their apps and visualizations with, and how the data is prepared and refreshed. We look forward to seeing future research in this area. It will be important to explore the user experiences that enable both the IT and business user side of this equation to function well. This should include a thorough understanding of the role of mobile and touch technologies in decision making. Moreover, the impact of this greater organizational independence on organizational flexibility merits more attention.

Synthesis

In the context of development increasing apace, digitization sets a challenge for companies to adapt to the changes in the environment. This chapter sets out to utilize strategy-as-practice, organizational renewal, and business intelligence research to illustrate the challenges faced by technology companies. From the perspective of organizational renewal, or dynamic capabilities, our paper highlighted the role of absorptive capacity, and the capability to acquire, assimilate, transform, and exploit knowledge effectively. Absorptive capacity was complemented by the strategy process and strategy-as-practice literature, suggesting a micro-practice of strategy work, through which companies continuously tend to craft strategies. Our approach aligns with strategy-as-practice in considering strategy as something that companies do (Whittington 2006). It follows that the management information systems employed, such as business intelligence systems, should support the everyday decision making conducted at the top- and middle-management levels. In accordance with prior studies, we emphasize the role of middle management in crafting and implementing strategy. Hence, the BI system and the user interface should support the work at the middle-management level.

This chapter develops and discusses the concept of real-time strategy, by which we mean strategic practice bolstered by almost-real-time information to support particularly effective management of the

organization. We consider the concept to involve a physical, and/or, virtual space that enables the effective review and modification of the received, stored, and processed information, which is aligned with the strategy and measurement framework developed according to contingencies (such as the characteristics of the business environment) and which creates the basis for the top- and middle-management decision making and the implementation of those decisions. We envisage the concept of real-time strategy being implemented through BI systems enabling interaction with the data on a real-time basis at the top- and middle-management levels. While the current BI systems provided by software suppliers offer opportunities for effective utilization of data in decision making, it is obvious that these capabilities will be stretched further in the future. Therefore, companies need to pay attention to the quality of the collected data and operate strategically when selecting the measures utilized to ensure they support the firm's business targets.

Building on the research conducted for this study and prior research on strategy-as-practice, organizational renewal, and business intelligence, some managerial guidelines can be presented for improved real-time strategic management:

- Design a strategy and BI system to guide the process of knowledge absorption.
- Clarify strategic logic and a few measures to guide management at different organizational levels.
- Collect knowledge for a purpose; know what you are doing it for.
- Ensure to/continuously develop data reliability and validity.
- Provide data and tools for self-service analytics where appropriate.
- Develop a single user interface utilizing reliable data for mission-critical decision making.
- Make decisions and design simple guidelines for knowledge implementation.
- Manage knowledge implementation and exploitation effectively.

References

Agarwal, R., & Helfat, C. E. (2009). Strategic renewal of organizations. *Organization Science, 20*(2), 281–293.

Andrews, K. (1971). *The concept of corporate strategy*. New York: Dow Jones-Irwin.

Ansoff, I. (1965). *Corporate strategy*. New York: Mc Graw-Hill.

Baskerville, R. L., Mathiassen, L., & Pries-Heje, J. (2005). Agility in fours: IT diffusion, IT infrastructures, IT developments, and business. In R. L. Baskerville, L. Mathiassen, J. Pries-Heje, & J. I. Degross (Eds.), *Business agility and information technology diffusion* (pp. 3–9). New York: Springer.

Brown, S., & Eisenhardt, K. (1997). The art of continuous change: Linking complexity theory and time-paced evolution in relentlessly shifting organizations. *Administrative Science Quarterly, 42*(1), 1–34.

Brueller, N., Carmeli, A., & Drori, I. (2014). How do different types of mergers and acquisitions facilitate strategic agility? *California Management Review*, *56*(3), 39–58.

Burgelman, R. A. (1991). Intraorganizational ecology of strategy making and organizational adaptation: Theory and field research. *Organization Science, 2*(3), 239–262.

Chandler, A. D. (1962). *Strategy and structure: Chapters in the history of the American industrial enterprise*. Cambridge, MA: Massachusetts Institute of Technology Press.

Clark, T. D., Jones, M. C., & Armstrong, C. P. (2007). The dynamic structure of management support systems: Theory development, research focus, and direction. *MIS Quarterly, 31*(3), 579–615.

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning an innovation. *Administrative Science Quarterly, 35*(1), 128–152.

Crossan, M. M., Lane, H. W., & White, R. E. (1999). An organizational learning framework: From intuition to institution. *Academy of Management Review, 24*(3), 522–537.

De Leeuw, A. C. J., & Volberda, H. W. (1996). On the concept of flexibility: A dual control perspective. *Omega, 24*(2), 121–139.

DeLone, W. H., & McLean, E. R. (1992). Information systems success: The quest for the dependent variable. *Information Systems Research, 3*(1), 60–95.

Doz, Y. L., & Kosonen, M. (2008a). The dynamics of strategic agility: Nokia's rollercoaster experience. *California Management Review, 50*(3), 95–118.

Doz, Y. L., & Kosonen, M. (2008b). *Fast strategy: How strategic agility will help you stay ahead of the game*. London: Wharton School Publishing.

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

Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: What are they? *Strategic Management Journal, 21*(Special Issue 10/11), 1105–1121.

Eisenhardt, K. M., & Sull, D. (2001). Strategy as simple rules. *Harvard business review*, *79*(1), 106–116.

Evans, J. S. (1991). Strategic flexibility for high technology manoeuvres: A conceptual framework. *Journal of Management Studies, 28*(1), 69–89.

Fredericks, E. (2005). Infusing flexibility into business-to-business firms: A contingency theory and resource-based view perspective and practical implications. *Industrial Marketing Management*, *34*(6), 555–565.

Hovorka, D. S., & Larsen, K. R. (2006). Enabling agile adoption practices through network organizations. *European Journal of Information Systems, 15*(2), 159–168.

Huikkola, T., Ylimäki, J., & Kohtamäki, M. (2013). Joint learning in R&D collaborations and the facilitating relational practices. *Industrial Marketing Management, 42*(7), 1167–1180.

Hutzschenreuter, T., & Kleindienst, I. (2006). Strategy-process research: What have we learned and what is still to be explored. *Journal of Management, 32*(5), 673–720.

Jarzabkowski, P. (2008). Shaping strategy as a structuration process. *Academy of Management Journal, 51*(4), 621–650.

Johnson, G., Melin, L., & Whittington, R. (2003). Micro strategy and strategizing: Towards an activity-based view. *Journal of Management Studies*, *40*(1), 3–22.

Kuwada, K. (1998). Strategic learning: The continuous side of discontinuous strategic change. *Organization Science, 9*(6), 719–736.

Lawrence, P. R., & Lorsch, J. W. (1967). *Organization and environment: managing differentiation and integration.* Cambridge, MA: Division of Research, Harvard Business School.

March, J. (1991). Exploration and exploitation in organizational learning. *Organization Science, 2*(1), 71–87.

McKinsey & Company. (2015). Learning from Google's digital culture. Retrieved from.

Mintzberg, H. (1994). The fall and rise of strategic planning. *Harvard Business Review, 73*(1), 107–114.

Mintzberg, H., & Lampel, J. (1999). Reflecting on the strategy process. *Sloan Management Review, 40*(3), 21–30.

Mintzberg, H., & Waters, J. A. (1985). Of strategies, deliberate and emergent. *Strategic Management Joumal, 6*(3), 257–272.

Porter, M. (1980). *Competitive Strategy*. New York: Free Press.

Ramakrishnan, T., Jones, M. C., & Sidorova, A. (2012). Factors influencing business intelligence (BI) data collection strategies: An empirical investigation. *Decision Support Systems, 52*(2), 486–496.

Sambamurthy, V., Bharadwaj, A., & Grover, V. (2003). Shaping agility through digital options: Reconceptualizing the role of information technology in contemporary firms. *MIS Quarterly, 27*(2), 237–263.

Sanchez, R. (1995). Strategic flexibility in product competition. *Strategic Management Journal, 16*(1), 135–159.

Sirén, C., & Kohtamäki, M. (2016). Stretching strategic learning to the limit: The interaction between strategic planning and learning. *Journal of Business Research, 69*(2), 653–663.

Sirén, C., Kohtamäki, M., & Kuckertz, A. (2012). Exploration and exploitation strategies, profit performance and the mediating role of strategic learning: Escaping the exploitation trap. *Strategic Entrepreneurship Journal, 6*(1), 18–41.

Taylor, B. (1997). The return of strategic planning—Once more with feeling. *Long Range Planning, 30*(3), 334–344.

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

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

Vaara, E., & Whittington, R. (2012). Strategy-as-practice: Taking social practices seriously. *The Academy of Management Annals, 6*(1), 285–336.

Van Hoek, R. I., Harrison, A., & Christopher, M. (2001). Measuring agile capabilities in the supply chain. *International Journal of Operations & Production Management, 21*(1/2), 126–148.

Volberda, H., Baden-Fuller, C., & van den Bosch, F. (2001). Mastering strategic renewal: Mobilising renewal journeys in multi-unit firms. *Long Range Planning, 34,* 159–178.

Whittington, R. (2006). Completing the practice turn in strategy research. *Organization Studies, 27*(5), 613–634.

Whittington, R. (2014). Information systems strategy and strategy-as-practice: A joint agenda. *The Journal of Strategic Information Systems*, *23*(1), 87–91.
Williamson, O. E. (1985). *The economic institutions of capitalism*. New York: Free Press.
Winter, S. G. (2003). Understanding dynamic capabilities. *Strategic Management Journal, 24*(10), 991–995.
Yuan, L., Zhongfeng, S., & Yi, L. (2010). Can strategic flexibility help firms profit from product innovation? *Technovation*, *30*(5–6), 300–309.
Zahra, S. A., & George, G. (2002). Absorptive capacity: A review, reconceptualization, and extension. *The Academy of Management Review, 27*(2), 185–203.

Authors' Biography

Marko Kohtamäki is a Professor of Strategy and a Director of the "Networked Value Systems" (NeVS) research program at the University of Vaasa. Previously he worked as Head of Department of Management as well. Prof. Kohtamäki also works as a Visiting Professor in the Luleå University of Technology and takes special interest in industrial service business or servitization, strategic practices, and business intelligence or management information systems in technology companies. He has published in several distinguished international journals, such as Strategic Management Journal, Industrial Marketing Management, Technovation, Journal of Business Research, and Strategic Entrepreneurship Journal. Kohtamäki has served as a project director in large-scale research projects, such as "Future Industrial services" and "Solutions for Fleet Management."

Donald Farmer is the Principal of TreeHive Strategy, a strategy consulting firm based in Seattle. Donald is an internationally respected thinker in the fields of data analysis and innovation, with over 30 years of experience. His background is very diverse, having applied data analysis techniques in scenarios ranging from fish-farming to archeology to advanced manufacturing. He has worked in award-winning start-ups in the UK and Iceland and spent 15 years at Microsoft leading teams designing and developing Business Intelligence products. Donald also worked as the Vice President of Innovation and Design at Qlik Technologies, during which time the firm was recognized as one of Forbes Top 10 Innovative Growth Companies. He is an advisor to globally

diverse government agencies and investment funds on data and innovation strategy. He also advises several start-ups worldwide, developing products and services ranging from restaurant management software in the Philippines to graph database analytics in Silicon Valley. He mentors individuals from junior inside sales reps to globally focussed executives. Donald lives with his wife, Alison, an artist, in an experimental woodland house in Seattle.