

# Chapter 4

## Unpacking Dynamic Capability: A Design Perspective

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**Abstract** This chapter<sup>1</sup> reviews the dynamic capability literature to explore relationships between definition, operationalization, and measurement of dynamic capability. Subsequently, we develop a design-oriented approach toward dynamic capability that distinguishes between design rules, recurrent patterns of behavior, operating routines and processes, market and competitive conditions, and performance outcomes. This framework serves to develop a number of propositions for further research. As such, we integrate the literature on dynamic capability that primarily draws on economics, with a design-oriented approach.

**Keywords** Dynamic capability · Organizational dynamics · Organizational Adaptation · Organizational design · Design rules · Recurrent patterns of behavior

### 4.1 Introduction

Today's business environments are fast-moving and open to global competition. This implies that firms need to develop major capabilities in managing change (Teece 2007; Verona and Ravasi 2003). Therefore, a fundamental question in the field of organization studies is how firms can develop the capacity to become more responsive to changes in market and competitive conditions (e.g., Henderson and Clark 1990; Kogut and Zander 1992; Teece et al. 1997). An increasing number of scholars promote the notion of dynamic capability to explain how certain firms achieve competitive advantage in situations of rapid and unpredictable change (Eisenhardt and Martin 2000; Priem and Butler 2001; Sirmon et al. 2007; Teece

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et al. 1997). The dynamic capability view (DCV) focuses on the dynamic processes of generating, developing, and accumulating a firm's resources, that is, the physical, human, and organizational inputs into the firm's value chain (Eisenhardt and Martin 2000; Javidan 1998; Teece et al. 1997). The DCV stresses the importance of path dependency, the history of a firm's current capabilities (i.e., to exploit its resources), as well as the importance of revising and reconfiguring these capabilities in the future as a response to market changes, and as such achieve and sustain a competitive advantage (e.g., Eisenhardt and Martin 2000; Javidan 1998; Teece et al. 1997; Zollo and Winter 2002). In this chapter, dynamic capabilities are defined as deliberate knowledge that is repeatedly applied in changing operating routines and processes.

The concept of dynamic capability has been predominantly subject to a theoretical debate (e.g., Eisenhardt and Martin 2000; Teece et al. 1997; Zollo and Winter 2002) and empirical research is still rare and exploratory in nature (e.g., Prieto and Easterby-Smith 2006; Sher and Lee 2004; Verona and Ravasi 2003). A fundamental challenge is to develop measures of dynamic capability that are grounded in existing theory, are empirically straightforward and valid (i.e., do not include direct or indirect measurements of firm performance, or specific rules and behaviors, that can raise a tautology problem), and serve to help practitioners make their organizations more effective in revising and reconfiguring their capabilities to exploit its resources. In order to respond to this challenge, we investigate the dynamic capability literature to explore relationships between definition, operationalization, and measurement of dynamic capability. As such, we assess what the collective understanding of dynamic capability appears to be at this point in time. By sampling a large number and broad range of papers, rather than focusing on the consensus list of key papers, this study differs from prior reviews of the dynamic capability literature (e.g., Wang and Ahmed 2007; Schreyögg and Kliesch-Eberl 2007).

Subsequently, we develop an integrated model of dynamic capability that draws on a design-oriented approach. In this respect, the notion design rules (representing purposeful and thoughtful (emerging or established) mental models of people) serves to unpack and operationalize what constitutes dynamic capability, in relation to how it is exposed in recurrent patterns of behavior (referring to a firm's organizational and strategic processes over time), as well as firm performance. Design rules thus may, or may not, be congruent to the recurrent patterns of behavior, which can be observed by researchers. This proposed turn in dynamic capability research is inspired by recent work on organization design that extends Simon's (1996) pioneering ideas in this area (e.g., Romme and Endenburg 2006), acknowledging a distinction between espoused beliefs and behavior and actual patterns of behavior that has not been acknowledged by evolutionary economics. As such, we extend the current literature on dynamic capability that largely draws on economics as its disciplinary base (Helfat et al. 2007), with theory on design. This approach may also facilitate practitioner-academic projects set up to make firms more effective in reconfiguring their operations and competencies.

## 4.2 The Nature of Dynamic Capability

### 4.2.1 Foundations of Dynamic Capability

Teece et al. (1997) introduced the concept of dynamic capability to explain a firm's competitive advantage. In their view, competitive advantage stems from high-performance routines operating inside the firm, shaped by distinctive organizational processes, asset positions and evolutionary paths (Teece et al. 1997). These high-performance routines constitute dynamic capability, defined as: "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (Teece et al. 1997: 516). In their view, dynamic capabilities are detailed and have rather predictable outcomes. In changing environments competitive advantage can thus be build through reshaping existing (tangible and intangible) resources and capabilities, and through creating new ones (Teece et al. 1997; cf. Zollo and Winter 2002). Schreyögg and Kliesch-Eberl (2007) describe Teece et al.'s view as the integrated dynamization approach, where dynamic capabilities include adapting, integrating and reconfiguring integrated clusters of resources and capabilities to match the changing environment.

Another important view on dynamic capability is that of Eisenhardt and Martin (2000), who treat dynamic capabilities as capabilities that shape a firm's resource position (e.g., capabilities in firm acquisition, alliancing, product development, strategic decision making). Eisenhardt and Martin (2000: 1107) adopt the following definition of dynamic capability: "the firm's processes that use resources – specifically the processes to integrate, reconfigure, gain and release resources – to match and even create market change. Dynamic capabilities thus are the organizational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, spit, evolve, and die." In Eisenhardt and Martin's (2000) view, dynamic capabilities are idiosyncratic and linked to market dynamism, exhibiting different features in two types of markets. In a moderately-dynamic market, dynamic capabilities resemble the traditional conception of capabilities as complicated, detailed and analytic. In high-velocity markets, however, dynamic capabilities tend to involve simple, experiential and unstable capabilities (Eisenhardt and Martin 2000). In addition, they argue that dynamic capabilities can be a source of competitive advantage if they are applied sooner, more straightforwardly, and more fortuitously than competition to create bundles of resources. As such, Eisenhardt and Martin (2000) suggest dynamic capabilities are specific capabilities that embrace not only detailed, analytic capabilities but also simple, experiential ones. Schreyögg and Kliesch-Eberl (2007) argue that Eisenhardt and Martin's (2000) view draws on a radicalization approach, in which radical dynamic capabilities serve to master high-velocity markets by linking and selecting capabilities to continuously create new combinations of resources.

### 4.2.2 *What Dynamic Capability Is Not*

A clear definition of dynamic capability also delineates what it is not. Several scholars have attempted to explain why dynamic capability is equivalent to, or differentiates from, problem solving routines. This discussion arises from Petroni (1998), who argues that routines adopted by firms in problem solving activities are the essence of dynamic capability. In 2003, Winter published a paper that introduces the concept of ad hoc problem solving, defined as non-routine and non-repetitious change activities, typically appearing as a response to relatively unpredictable events. According to Winter (2003), the ability to solve problems does not necessarily imply a dynamic capability (i.e., the ability to change the way the firm solves its problems). In fact, dynamic capabilities may be quite rare (Winter 2003). In this respect, Winter (2003) contrasts the cost structure of dynamic capabilities with that of ad hoc problem solving. Dynamic capabilities involve long-term commitments to specialized resources, for example, new product development or account management. The ability to sustain a particular approach and commitment to, for example, account management depends to some extent on continuity in staff experience, information systems, and client networks (cf. Winter 2003). However, Winter (2003) argues that the costs of ad hoc problem solving largely disappear if there is no problem to solve. These costs, if any, tend to be opportunity costs of staff with alternative productive roles in the organization (Winter 2003). The fundamentally different cost structures between dynamic capabilities and ad hoc problem solving may explain why dynamic capabilities tend to be rare and ad hoc problem solving tends to prevail in many firms.

Dynamic capabilities are also different from operating routines and processes (i.e., the firm's primary processes such as product development, production and sales); that is, dynamic capabilities govern the rate of change of operating routines and processes (Collis 1994). More specifically, Winter (2003) argues that dynamic capabilities operate to extend, modify or create ordinary (substantive) capabilities (i.e., operating routines and processes). In addition, Zollo and Winter (2002: 340) define dynamic capability as: "a learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness." In other words, we distinguish here between changes in operations such as rearranging chairs on a sinking ship (i.e., addressing symptoms) and those that change course and avoid hitting an iceberg (i.e., addressing causes). The definition of Zollo and Winter (2002) further implies dynamic capabilities consist of patterned organizational behavior that companies invoke on a repeated rather than idiosyncratic basis (cf. Cepeda and Vera 2007; Helfat et al. 2007). Although many scholars define dynamic capabilities as high-level routines (e.g., Teece et al. 1997), which implicates repetitive action patterns, only few definitions of dynamic capability *explicitly* incorporate the requirement of repetition (e.g., Wang and Ahmed 2007; Zollo and Winter 2002).

### 4.2.3 *Dynamic Capability and the Tautology Problem*

Dynamic capability involves three levels of analysis: its output or outcome, the capability itself, and what makes up the capability. The current literature tends to be unclear about the level of analysis. Moreover, the levels of analysis are interwoven. For example, dynamic capability and firm performance are intertwined in many studies. Because dynamic capabilities “pursue improved effectiveness” (Zollo and Winter 2002: 340), dynamic capability is considered to improve (1) financial performance in terms of return on assets and return on sales and/or (2) business performance in terms of market share, sales growth, diversification, and product development. This may raise a tautology problem in measuring dynamic capabilities, particularly when dynamic capability is inferred from successful firm performance: if the firm performs well, it apparently possesses dynamic capability; if performance is not superior, then the firm apparently scores low on dynamic capability (Zahra et al. 2006).

Eisenhardt and Martin (2000) first attempted to untangle dynamic capabilities from firm performance in order to solve the tautology problem. They state that dynamic capabilities are identifiable, specific processes that are neither vague nor tautological. Zott (2003) also makes the distinction between dynamic capabilities and firm performance, by synthesizing Zollo and Winter’s (2002) work into an evolutionary model in which change processes (i.e., dynamic capabilities) operate on a firm’s resource position, which then determines its performance in a competitive marketplace. Other scholars who focus on this issue are Zahra et al. (2006) and Helfat et al. (2007). They deliberately attempt to decouple the definition and measurement of dynamic capability from financial and business performance. For example, Zahra et al. (2006) describe dynamic capabilities as the abilities to reconfigure a firm’s resources and routines in the manner its principal decision-maker(s) envisioned it. Similarly, Helfat et al. (2007) describe dynamic capability as the firm’s capacity to purposefully create, extend, or modify its resource base, acknowledging that change in the resource base of an organization implies only that the organization is doing something different, but not necessarily better than before. Helfat et al. (2007) further propose the notion of evolutionary fitness, referring to how well a dynamic capability enables an organization to make a living by creating, extending, or modifying its resource base (i.e., living long term). By contrast, technical fitness refers to how effectively a capability performs its intended function (i.e., intended on the short term). Technical fitness has two dimensions: quality and cost, that is, how well the capability performs respectively how much it costs to perform at a certain level (Helfat et al. 2007). Evaluating technical fitness, however, needs to take place at an ad hoc basis, which could raise a new tautology problem.

A small number of *empirical* studies avoid firm performance indicators in measuring dynamic capability (Daniel and Wilson 2003; Newbert 2005; Verona and Ravasi 2003; Wilson and Daniel 2007). But the approach taken in most empirical studies does raise the tautology problem (e.g., Arthurs and Busenitz 2006; Iansiti and Clark 1994; Wilkens et al. 2004). For example, Arthurs and Busenitz (2006)

measure dynamic capability in terms of the one year risk-adjusted stock price returns (as the performance indicator).

However, when firm performance is (conceptually) decoupled from dynamic capability, other issues remain. Defining dynamic capability in terms of for example specific behaviors rather than an ability to accomplish something, is as tautological as defining it in terms of firm performance. If a dynamic capability is an ability to do something (cf. Teece et al. 1997), then logically, it could change its meta-rules and still have the capability, even if the rules and behaviors change. An admittedly feeble analogy is a pitcher in baseball who has a really low Earned Run Average (ERA) (i.e., output or outcome of a capability). This could be based in a capability of throwing very fast balls, or in a capability to throw a variety of pitches and sequence them, so that hitters are taken by surprise (i.e., the capability itself). Those capabilities, in turn, are grounded in specific actions and behaviors (i.e., what makes up the capability).

An example taken from the field of individual learning and training illustrates how one might overcome such tautology problems. To demonstrate whether what was learned in a specific training is also actually applied on the job, two steps have to be taken. First, one needs to demonstrate behavioral changes in on-the-job behavior and second, one needs to demonstrate that such changes are due (at least partly) to the specific training the employee was exposed to (Cascio 1998). Applying this to dynamic capability, researchers need to demonstrate that changes in operating routines and processes are due to at least one dynamic capability, instead of solely examining if the existence of one or more dynamic capabilities leads to successful organizational firm performance, versus if underperformance results from the absence of such capabilities. In this respect, a fundamental challenge is to develop measures of dynamic capability that are grounded in existing theory, are empirically straightforward and valid (i.e., do not include direct or indirect measurements of firm performance, or specific rules and behaviors), and serve to help practitioners make their organizations more effective in revising and reconfiguring resources. Therefore, we propose a new definition of dynamic capability.

#### ***4.2.4 Defining Dynamic Capability***

The previous review of what dynamic capability is (not) implies the following components of our definition of dynamic capability: dynamic capability involves those capabilities in a firm . . .

- that convey *deliberate* knowledge (among its key agents), invoked on a repeated basis (e.g., Cepeda and Vera 2007; Helfat et al. 2007; Sher and Lee 2004; Zollo and Winter 2002), on how to question purpose and effectiveness of the resource base (e.g., Helfat et al. 2007; Winter 2003; Zollo and Winter 2002);
- that serve to generate and modify operating routines and processes (e.g., Eisenhardt and Martin 2000; Teece et al. 1997; Zollo and Winter 2002) to address changing environments and/or create market change (e.g., Eisenhardt and Martin 2000; Teece et al. 1997).

We thus define dynamic capability as capabilities *that convey deliberate knowledge, invoked on a repeated basis, on how to question purpose and effectiveness of the resource base; this deliberate knowledge serves to generate and modify operating routines and processes to address changing environments and/or create market change*. This implies the routinized ability to raise particular questions regarding the effectiveness of particular operating routines and processes can be regarded as a dynamic capability.

The proposed definition imposes boundaries on which capabilities can be understood as being dynamic in nature, which has obvious implications for what should not be interpreted as a dynamic capability. In particular, our definition, more explicitly than in some other studies (e.g., Eisenhardt and Martin 2000; Teece et al. 1997), implies that routinized capabilities with a low level of awareness are not understood as dynamic in nature. Similarly, a dynamic capability that subsequently matures and becomes more habitual and therefore requires less and less conscious thought (cf. Helfat and Peteraf 2003), as such breaks down as a dynamic capability (it may constitute a growing capability that is operational in nature). In addition, our definition implies that dynamic capability is likely to have a positive effect on firm performance. However, it does *not* imply that firm performance automatically increases as a result of developing a dynamic capability. In this respect, firm performance depends on other factors affecting performance, such as market and competitive conditions beyond the control of the firm.

### 4.3 Unpacking Dynamic Capability

Given our definition of dynamic capability, the question arises how scholars engaging in dynamic capability research can respond to practitioners who would like to build this kind of capability within their firm. As such, we need to unpack the notion of dynamic capability (cf. Teece 2007; Eisenhardt and Martin 2000). Teece (2007) adopted a micro-practice perspective enabling a deeper understanding of the structural, cognitive and behavioral constituents of dynamic capabilities. Eisenhardt and Martin (2000) also anticipate this kind of challenge by identifying dynamic capabilities as concrete business operations in the form of specific capabilities by which managers alter their resource base. In this respect, the existing literature focuses on dynamic capabilities as *recurrent patterns of behavior* in organizational and strategic processes over time, which refer to a firm's managerial and organizational processes (e.g., resource allocation) rather than the primary processes such as product development, production and sales (i.e., operating routines and processes) (e.g., Helfat et al. 2007; Rindova and Kotha 2001; Zollo and Winter 2002). In this chapter, we extend Eisenhardt and Martin's proposal by differentiating dynamic capabilities in recurrent patterns of behavior and so-called *design rules*.

The design perspective adopted here is inspired by recent work that extends Simon's (1996) pioneering ideas in this area (e.g., Brusoni and Prencipe 2006; Dunbar and Starbuck 2006; Romme and Endenburg 2006). Simon (1996) argues that

creating new organizational designs or redeveloping existing ones asks for principles from which the rest will develop (Simon 1996). Romme and Endenburg (2006) describe design rules as any coherent set of guidelines for designing and developing organizations, grounded in a related set of construction principles (i.e., any coherent set of normative ideas and propositions for producing new organizational structures and forms and redeveloping existing ones). Design rules serve as a heuristic device that describes ideas and intentions underlying a particular organizational design and helps to make sense of the processes produced by this design and any changes the design needs to undergo (Romme and Endenburg 2006).

Romme (2003) and Van Aken (2004) suggest the notion of design rules serves to connect the largely descriptive and explanatory nature of academic (management) research to the largely normative and pragmatic ways of reasoning and acting by practitioners. Their work emphasizes the importance of a certain level of awareness (e.g., among key agents, such as executives and middle managers) of the design rules because these rules represent (emerging or established) mental models of managers, engineers, sales people, and other agents (i.e., what people believe they should do). However, evolutionary economists (e.g., Heiner 1983) define rules more broadly, as depicting the repertoire of actions the agent actually engages in (but is not necessarily aware of). More particularly, agents develop or adopt rules when certain actions are unreliable in responding to the environment and they are therefore better off limiting or reducing their repertoire of actions (Heiner 1983; Langlois 1986). This may seem paradoxical, because it implies that both stable and volatile environments imply rule-following behavior. The behavioral dynamics, however, are different. A stable environment implies rather rigid and predictable behavior as an adaptation to the lack of environmental change. But once the environment becomes volatile, its demands begin to exceed the agent's ability to respond. This causes the agent to retreat to more predictable patterns of action (Heiner 1983; Langlois 1986). Our distinction incorporates both the awareness dimension (i.e., design rules) and the evolutionary dimension (i.e., recurrent patterns of behavior).

The complex relation between design rules driving dynamic capability and recurrent patterns of behavior exhibiting dynamic capability has two major dimensions: intentionality and legitimacy. The intentionality dimension is acknowledged by Augier and Teece (2007), who argue that dynamic capabilities include an organization's (non-imitable) ability to sense changing customer needs, technological opportunities, and competitive developments, as well as its ability to adapt to and possible shape, the business environment in a timely and efficient manner: "A significant element of intentionality is involved" (Augier and Teece 2007: 179). As such, we extend this perspective by arguing that the emerged or established mental models of managers, engineers, sales people and other agents (i.e., design rules) drive the (re)creation of dynamic capability as an artifact and sustain its viability over time. This is the intentionality dimension of the relation between design rules and recurrent patterns of behavior.

The legitimacy dimension refers to the support from external stakeholders (e.g., shareholders, suppliers, local community) as well as internal stakeholders (e.g., board of directors, union representatives, middle management, employees) for any



dynamic capability. Achieving legitimacy is critical (Zahra et al. 2006), even if dynamic capability is underdeveloped. It is useful to draw an analogy with what Argyris, Putnam, McLain Smith (1985) call theory-in-use and espoused theory. Theory-in-use involves what people actually do (i.e., recurrent patterns of behavior) and espoused theory is what they say they do (i.e., design rules). There is ample evidence that people in organizational settings behave consistently with their mental models, but often do not act congruently with what they espouse (Argyris et al. 1985). In other words, what is espoused may, or may not, be congruent to the actual patterns of capabilities (e.g., observed by researchers).

Figure 4.1 summarizes our framework. In this framework, the main object of dynamic capability is the incumbent firm’s operating routines and processes (Adner and Helfat 2003; Eisenhardt and Martin 2000; Wang and Ahmed 2007), implying that a dynamic capability serves to create new operating routines and processes or change existing ones. Moreover, the model in Fig. 4.1 implies that market and competitive conditions influence the emergence and evolution of dynamic capability (e.g., as input into discussions on business strategy), whereas the latter has an indirect impact on the market and competitive conditions by way of changes in the operating routines and processes. The evolutionary fitness between the operating routines and the market and competitive conditions over time determines firm performance (cf. Helfat et al. 2007). As such, the relationship between dynamic capability and long-term performance is an indirect one (Adner and Helfat 2003; Eisenhardt and Martin 2000; Wang and Ahmed 2007). In the remainder of this section we use this framework to develop a set of propositions for further research.

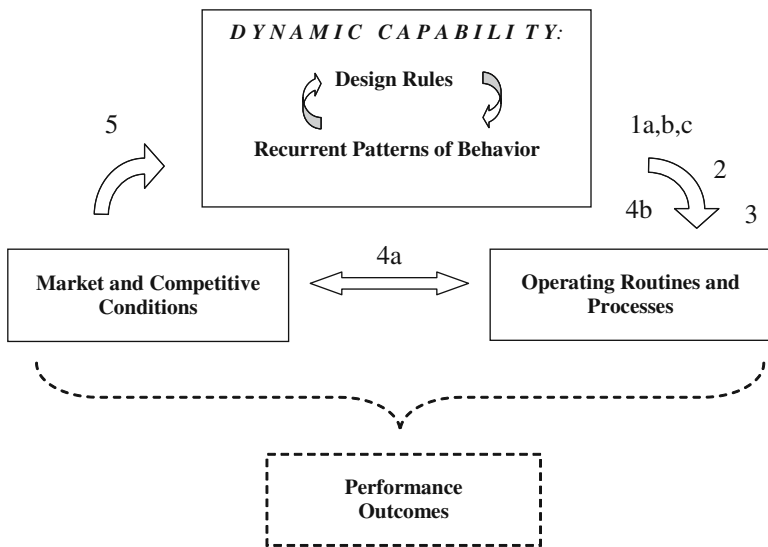


Fig. 4.1 Unpacking dynamic capability (numbers refer to propositions)

### ***4.3.1 Design Rules: Deliberate Knowledge on Questioning Purpose/Effectiveness***

The definition of dynamic capability we developed previously implies that a firm's performance in timely revising and reconfiguring its resource base, depends on deliberate knowledge (in terms of explicit design rules) and frequency (i.e., repetition) of invoking this knowledge (Helfat et al. 2007; Sher and Lee 2004; Zollo and Winter 2002). For example, Rubbermaid failed to adapt its "product innovation" strategy to the changing market conditions in the 1990s, as a result of the new CEO who came on board in 1992 and appeared to be "a desensitized leader who consistently missed the most telling signs of change in the industry and allowed his organization to become slow, unresponsive, and stagnant" (Helfat et al. 2007: 52). This episode in Rubbermaid's history illustrates how executives who miss any knowledge as well as experience in questioning the firm's resource base undermines the firm's capability to timely and effectively anticipate and respond to changes in market and competitive conditions (cf. Helfat et al. 2007). We therefore formulate the following claims:

Proposition 1a: The more deliberate knowledge the key agents in the incumbent firm have (in terms of explicit design rules) on how to question purpose and effectiveness of its resource base (D), the more effective they will be (i.e., in terms of setting right targets and choosing appropriate actions to achieve an overall goal) in changing its operating routines and processes (E).

Proposition 1b: The higher the frequency of invoking and applying this knowledge (F), the more effective the firm will be in (repeatedly) changing its operating routines and processes (E).

Proposition 1c: The causal claims in propositions 1a and 1b reinforce each other. That is,  $E = f(D \times F)$ , assuming all three variables are measured on a scale of 0 to 1.

Proposition 1c implies that at very high levels of both deliberate knowledge and the frequency of applying this knowledge, there are decreasing marginal returns in effectiveness. Another implication is that if either the deliberate knowledge or the frequency of its application is at a very low level (i.e., close to 0), increases in the level of the other variable will hardly affect effectiveness.

In the remainder of this section, we will refer to deliberate knowledge of questioning purpose and effectiveness of the firm's operating routines and processes in terms of design rules.

### ***4.3.2 Congruence of Design Rules and Recurrent Patterns of Behavior***

Adner and Helfat (2003) introduced the notion of dynamic managerial capabilities involving managerial cognitions, beliefs and mental models (i.e., design rules). These capabilities influence the strategic and operational decisions of managers (i.e.,

the recurrent patterns of behavior). We further elaborate this idea, by drawing on the notion of congruence between what managers believe and say they do and what they actually do.

A substantial incongruence, or gap, between espoused theory and actual behavioral patterns tends to arise when managers are severely challenged and engage in defensive reasoning. The incongruence between what is espoused and what is actually done is a major source of organizational inertia, because it inhibits both individual and organizational learning (Argyris et al. 1985). This phenomenon has been observed in many empirical studies of unsuccessful organizational and strategic change projects (e.g., Foss 2003; Helfat et al. 2007; Labianca et al. 2000). For example, the Danish firm Oticon (now William Demant Holding) tried to delegate decision-making to improve entrepreneurial capabilities and motivation at local organizational levels (Foss 2003). As such, Oticon's senior management deliberately attempted to build a credible commitment *not* to intervene in delegated decision-making (cf. the espoused design rules in this case). Nevertheless, frequent managerial meddling with delegated rights led to a severe loss of motivation (cf. the recurrent patterns of behavior) and caused Oticon to return to a much more conventional type of organization (Foss 2003).

By contrast, other studies suggest that organizational and strategic change occurs much more effectively if managers demonstrate a high level of congruence between promoting and practising the continuous search for new ideas and methods, trial and error experimentation, and so forth (e.g., Marcus and Anderson 2006; Rindova and Kotha 2001). For example, Rindova and Kotha (2001) observe that Yahoo! engages in continuous morphing of its form and function in the market, to the degree that it engages in self-organizing through reliance on simple organizational principles. An important difference with other cases (e.g., Oticon) appears to be the congruence between the principles espoused by the top management team and the behavior this team actually exhibits. Similarly, in a study of large firms in a variety of manufacturing industries Menguc and Auh (2006) observe that market orientation, as an espoused intention, does not qualify as a dynamic capability in itself. Market orientation only positively affects firm performance when it is complemented by practising continuous innovation and experimentation (Menguc and Auh 2006). In sum, this leads to the following proposition:

Proposition 2: The greater the congruence between design rules for and the recurrent patterns of behavior in changing operating routines and processes, the more effectively the incumbent firm can engage in continuous experimentation and innovation and the less likely it will suffer from organizational inertia.

### ***4.3.3 Codifying Distributed Learning and Control***

In the context of knowledge codification (e.g., written documents for the purpose of storing knowledge), information technology is generally understood as an important device for enhancing dynamic capability (e.g., Sher and Lee 2004). There is an emerging body of evidence, however, that suggests knowledge codification may

enhance operating routines and processes, but tends to undermine organizational and strategic transformation processes (e.g., Bhatt and Grover 2005; D’Adderio 2004; Mosey 2005).

An interesting example is the attempt to design and implement knowledge management practices at Infosys Technologies, the global software services firm. In the early 1990s Infosys started to transform employees’ knowledge into an organization-wide resource that would “make every instance of learning within Infosys available to every employee” (Garud and Kumaraswamy 2005: 22). This project involved, amongst others, a central knowledge portal supported by e-mail, bulletin boards, and repositories for marketing, technical, and project-related information. To motivate employees to contribute content to the knowledge portal, Infosys implemented an incentive system involving monetary rewards or prizes, which produced several unintended consequences, such as information overload, decreasing quality and relevance of contributions, and a breakdown of the culture of freely sharing knowledge (Garud and Kumaraswamy 2005). The incentive system was therefore substantially modified and reduced, to decrease its negative impact on the informal culture of collaborative learning and knowledge sharing (Garud and Kumaraswamy 2005).

D’Adderio (2004) analyzed the influence of software on the dynamic capability of IT and other high-tech firms. She observes how the authority to change in these firms becomes distributed among engineers, software systems and design practices. D’Adderio (2004) finds that the disciplining action of software can be beneficial to certain, clearly structured processes for which requirements for stability and control are high; but it can represent a source of rigidity to other, more unstructured, functions and activities. An excessive emphasis on control may prevent the exploration of alternative technology configurations, as well as weaken the ability to incorporate heterogeneous knowledge inputs in the design (including inputs from customers and suppliers, and design feedback from other organizational functions and disciplines) (D’Adderio 2004).

In sum, this suggests that standardization and codification may be quite effective if applied to well-structured and unambiguous processes (e.g., a sequence of operations in a particular work setting), but less so for the more complex and ambiguous processes of distributed learning and control. This implies the following proposition:

**Proposition 3:** Firms adopting design rules (for organizational and strategic change) that involve distributed learning and control will be more effective if the latter processes are not, or to a very limited extent, standardized and codified in software systems.

#### ***4.3.4 Market/Competitive Conditions and the Nature of Design Rules***

As we have observed earlier, the behavioral dynamics of creating dynamic capability is fundamentally different in stable versus dynamic (market) conditions. Drawing on

game theory, Langlois (1986) argues that increased flexibility is always desirable as the volatility of the environment increases. This increased flexibility tends to come in the form of more general actions, rather than specialized actions, that can be applied across a variety of environmental states (Langlois 1986).

This theoretical finding corresponds with the observation by Eisenhardt and Martin (2000) that routines in very volatile markets are purposefully simple, although not completely unstructured. Langlois' (1986) proposition also resonates with Rindova and Kotha (2001), who observe that the dynamic capability of Yahoo! is emergent and evolving, and grounded in open-ended organizing principles (cf. design rules). For example, the vice president of business development of Yahoo! is reported to describe the principles for creating partnerships as follows: "Put the product first. Do a deal only if it enhances the customer experience. And enter no joint ventures that limits Yahoo!'s evolvability" (Giroto and Rivkin 2000; cited in: Rindova and Kotha 2001: 1274). Other design rules for dynamic capability at Yahoo! involve a decentralized structure emphasizing the autonomous action of individuals. These general, open-ended design rules appear to be at the core of Yahoo's dynamic capability as a simple set of rules that are repetitively applied to changing operating routines and processes (Rindova and Kotha 2001).

Another example of a deliberate attempt to develop design rules for dynamic capability is Romme and Endenburg's (2006) study of circular organizing in more than thirty small and medium-sized firms, all situated in increasingly volatile environments. These organizations share a body of principles for increasing organizational capacity for self-regulation and learning. These principles involve a set of general heuristics regarding search, learning and hierarchy (e.g., "mistakes must be made") as well as a set of simple rules for organizational decision-making, governance and learning (e.g., "decisions on policy issues are taken by informed consent") (Romme and Endenburg 2006: 295–296). These design rules serve to create and sustain a particular type of communication and decision processes that leave the content of decisions and actions (to be) taken open and responsive (Romme and Endenburg 2006).

These findings suggest that open-ended design rules for dynamic capability (e.g., with regard to decentralized processes and local autonomy) apply to a broad set of environmental cues. By contrast, more closed design rules (e.g., "when acquiring another firm, first assess the target firm by means of our M&A protocol") apply to a specific category of environmental cues. In sum, we suggest that increased volatility in market and competitive conditions implies that open-ended design rules can be used, whereas increased stability has the opposite effect:

**Proposition 4a:** The more volatile the market and competitive conditions are, the more likely it is that changes in operating routines and processes will occur.

**Proposition 4b:** The latter relationship is reinforced by open-ended design rules for organizational and strategic change and undermined by relatively closed rules. That is, open-ended design rules for change are more effective

in changing operating routines and processes than closed design rules (in volatile market and competitive conditions).

Zollo and Winter (2002) argue that the level of investment in developing dynamic capabilities will be the lowest when the firm draws on experience accumulation, as the learning then happens in an essentially semi-automatic fashion (e.g., learning-by-doing). This is therefore likely to be a valid approach in less volatile market environments. In more volatile environments, the learning investment is likely to be higher, particularly when the organization (or the relevant unit) relies on knowledge articulation (e.g., in meetings) to attempt to master or improve a certain activity because the organization will have to incur costs due to the time and energy required for people to meet and discuss their respective experiences and beliefs. This implies the necessity of a high level of cognitive effort because there is a certain level of understanding of the causal mechanisms intervening between the actions required to execute a certain task and the performance outcomes produced. According to Zollo and Winter (2002), such articulation efforts can produce an improved understanding of the new and changing action-performance links, and as such result in adaptive adjustments to the existing sets of routines or in enhanced recognition of the need for more fundamental change. Moreover, the learning investment and cognitive effort will be the highest for knowledge codification because when executing the task, people not only have to meet and discuss, but they also have to actually develop a document or a tool (e.g., manual or piece of software) aimed at distilling the insights achieved during discussions. If such a document or tool already exists, one has to decide whether and how to update it, and then to actually do the update (Zollo and Winter 2002). Mosey's (2005) study of five small- and medium-sized firms engaging in new-to-market product development illustrates this. In firms effectively engaging in product development, managers empower cross-functional teams to evaluate new technologies with a substantial number of external partners, but also systematize and codify learning between projects (Mosey 2005). This leads to the following claim:

**Proposition 5:** The more knowledge intensive the operating routines and processes required by market conditions and industry standards are, the more effectively the incumbent firm can develop and apply design rules (for organizational and strategic change) that draw on knowledge articulation and codification.

These five propositions constitute a preliminary set of causal claims. In this respect, senior management faces the need to develop knowledge on how to question purpose and effectiveness, be congruent in terms of talk and walk, facilitate distributed learning and control without overreliance on standardization and codification, create a balance between the level of environmental volatility and the open-ended nature of design rules, and finally, align the knowledge intensity of the firm's operations with the level of articulation and codification of organizational and strategic change projects. The propositions 1 and 2 are rather novel, while propositions 3, 4 and 5 serve to summarize what previous studies imply. Some of these

generative processes can be inherently antagonistic (such as those in propositions 3 and 5), which makes building and sustaining dynamic capability indeed a major challenge.

## **4.4 Discussion and Conclusion**

### ***4.4.1 Informing the Theory and Practice of Organizational Design***

We have advocated a theoretical perspective in this chapter that ties previous research together as well as extending it. The proposed definition of dynamic capability that is grounded in a review of the literature, provides a starting point for scholars who wish to operationalize the notion of dynamic capability without producing the tautology problem. In addition, the design-based theory described in the previous sections allows for a variety of design rules and related operating routines and processes that scholars and practitioners can draw on, by focusing on the interaction and co-evolution between dynamic capability, operating routines and processes, and market and competitive conditions (cf. Fig. 4.1). As such, the approach proposed may facilitate practitioner-academic projects, particularly those intended to make firms more effective in responding to and anticipating changes in external conditions as well as reconfiguring their operating routines and processes.

The design-based approach we have advocated implies a fundamental extension of the evolutionary argument that currently prevails in the dynamic capability literature. In particular, collaborative research with senior executives that uncovers and codifies the espoused and behavioral dimensions of dynamic capability may serve to enhance this capability (cf. Rindova and Kotha 2001). The theory developed in this chapter explicitly acknowledges the possible gap between intended rules and observed patterns of behavior. Evidently, the sensitivity of the issues addressed here may create difficulties in obtaining access to empirical sites. In this respect, scholars will be more successful if they develop long-term partnerships with practitioners and their organizations and are able to deliver tangible results in terms of codified (future) practices.

### ***4.4.2 Suggestions for Future Research***

Future work should draw on further elaborating and explaining the relation between dynamic capability and external influences. In particular, we need to study the generative forces that drive the co-evolution between operating routines and processes and market and competitive conditions, and its effect on performance outcomes (cf. Fig. 4.1). The notions of technical and evolutionary fitness, suggested by Helfat et al. (2007), provide an appropriate framework for future work in this area. In addition, studies that draw on both quantitative and qualitative data will be more likely

to advance the theory of dynamic capabilities. Given the lack of consensus on key concepts and measurements, scholars cannot yet exclusively rely on quantitative data to establish causal relationships between dynamic capabilities, operating routines and processes, market and competitive conditions, and performance outcomes. Future research may thus benefit from adopting other research methods as well, such as simulation modeling (e.g., Lenox 2002). Although biases and limitations of the modeler might be simulated as well, an advantage of simulation modeling is that experimenting in a model environment can provide valuable insights into the complex feedback loops linking the antecedents, processes and outcomes of dynamic capability. In addition, simulation modeling may capture the evolution of dynamic capabilities more effectively than any other research method.

### **4.4.3 Conclusion**

Building and sustaining dynamic capability provides a significant challenge, for practitioners trying to create such a capability as well as for researchers attempting to understand the process of capability formation. In this chapter we developed an integrative framework of this phenomenon. This framework suggests how dynamic capability can be unpacked and empirically studied. As such, it provides a starting point for future theoretical work as well as empirical tests that may advance knowledge on dynamic capabilities as key drivers of long-term business performance.

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