

HOW DYNAMIC CAN ORGANIZATIONAL CAPABILITIES BE? TOWARDS A DUAL-PROCESS MODEL OF CAPABILITY DYNAMIZATION

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The recent discussion in the field of strategic management broadly favors the idea of dynamic capabilities in order to overcome potential rigidities of organizational capability building. The major question addressed in this paper is whether capabilities can actually be conceived as being in flux—and if so, to what extent and in which way? After briefly recapitulating the distinguishing features of organizational capabilities, path dependency, structural inertia, and commitment are identified as the main capability-rigidity drivers causing a managerial dilemma. In the search for a resolution of this dilemma different approaches of dynamic capabilities are identified and discussed. The analysis shows that the approaches suffer from inherent conceptual contradictions: the dynamization runs the risk of dissolving the original idea and strength of organizational capability building. Ultimately, capabilities would lose the strategic power attributed to them in the resource-based view. The last section of this paper therefore aims to develop an alternative approach, which aims at preserving the original merits of organizational capability and solving the rigidity issue not by integrating a dynamic dimension into the capability construct but rather by establishing a separate function ('capability monitoring'). The suggestions mount up to a tier solution. Its logic builds on the dynamics of countervailing processes and second-level observation. Copyright © 2007 John Wiley & Sons, Ltd.

INTRODUCTION

The concept of organizational capability has attracted a lot of interest primarily in the field of strategic management. In the resource-based view (RBV) organizational capabilities have been identified as one major source for the generation and development of sustainable competitive advantages (Barney, 1991; Wernerfelt, 1984). Incomplete factor markets allow for heterogeneity among firms in terms of resources and capabilities.

Upon these differences firms can build competitive advantages and rent differentials (Amit and Schoemaker, 1993; Barney, 1997; Peteraf, 1993). Thus the strategic position of a firm varies systematically with the availability and allocation of resources which are rare and superior in use, relative to others. Central to the generation of a (sustainable) competitive advantage is the capability of an organization to create more value than the least efficient competitor (Peteraf and Barney, 2003: 314).

The identification of social and behavioral features of resources and capabilities has been informed by insights from evolutionary economics (Helfat and Peteraf, 2003; Nelson and Winter, 1982; Winter, 2003). Capabilities are developed in the context of organizational resource allocation which is embedded in idiosyncratic social

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structures. On this basis capabilities are conceived as *distinct* behavioral patterns, which are complex in nature involving both formal and informal processes (Dosi, Nelson, and Winter, 2000; Hofer and Schendel, 1978; Sanchez and Mahoney, 1996). Capabilities represent a repository of historical experiences and organizational learning (Winter, 2000). In case of superior performance and a unique historical development, capabilities are assumed to build the foundation for sustainable competitive advantage.

Recently in the capability debate, the issues of volatile markets, environmental uncertainty, and change have come to the fore. Building on the observation that markets and superior market positions have increasingly become subject to erosion processes, the reliance on a specific set of nurtured capabilities has been called into question. Instead the emphasis has shifted to the ability to change and quickly develop new organizational capabilities as a critical prerequisite for sustaining competitive advantages. The salient concepts in this debate are ‘dynamic capabilities’ (Teece, Pisano, and Shuen, 1997; Kusunoki, Nonaka, and Nagata, 1998; Eisenhardt and Martin, 2000; Zollo and Winter, 2002; Winter, 2003) or ‘dynamic core competencies’ (Danneels, 2002; Lei, Hitt, and Bettis, 1996), both call for a profound *dynamization* of organizational capabilities. The notion of ‘dynamic’ is devoted to addressing the continuous renewal of organizational capabilities, thereby matching the demands of (rapidly) changing environments. The concept of dynamic capabilities revises the RBV insofar as not only the markets but also the organizational capabilities are conceptualized as being dynamic and flexible (Helfat and Peteraf, 2003: 998).

From our point of view, however, the postulation of continuous renewal on the one hand and the patterned architecture of organizational capabilities on the other constitutes a serious disparity implying far-reaching theoretical and practical consequences. So far, this deep-seated discrepancy has not gained noticeable attention. This paper therefore aims to elaborate on this disparity.

We start by asking the question of whether a dynamic dimension can be included in the concept of organizational capability without sacrificing theoretical coherence—and if so, to what extent? The analysis will show that aside from undisputable merits, the idea of dynamizing capabilities is prone to ‘throwing out the baby with the bath

water.’ The suggested dynamization is likely to crowd out the genuine essence of an organizational capability. In reaction to this conclusion we suggest an alternative conception, which aims to preserve the genuine strengths of organizational capabilities and assure the dynamization of corporate capability management in a different way by establishing a separate function (‘capability monitoring’). After explaining its main elements and the underlying logic, the closing section outlines practical implications and discusses conclusions for future research on organizational capabilities and the requirements of a dynamic resource-based theory.

As the conceptions of organizational capability have varied broadly it seems imperative to begin the discussion by clarifying what organizational capabilities are supposed to mean—thereby establishing a solid basis for the subsequent analyses.

WHAT ARE ORGANIZATIONAL CAPABILITIES?

In strategic management organizational capabilities are depicted as critical success factors and these days nearly every organization wants to be perceived as being capable of doing something in an outstanding manner. But what exactly does a ‘capability’ mean and what are its essential features? A closer look at the literature reveals that the conception has often been left vague (Collis, 1994). Some authors address it as a well-known colloquial expression, while others emphasize particular dimensions only. It therefore seems advisable to start the discussion by clarifying the meaning of organizational capabilities. There is a huge variety in the literature on the labeling: some authors call it (core) competence; others call it collective skills, complex routines, best practices, or organizational capabilities. In the context of dynamics and change the term ‘capability’ has gained predominance. We therefore use this term throughout the article without denying the merits of the other constructs.

There seems to be a consensus that a capability does not represent a single resource in the concert of other resources such as financial assets, technology, or manpower, but rather a distinctive and superior way of allocating resources. It addresses complex processes across the organization such as product development, customer relationship, or

supply chain management. In contrast to rational choice theory and its focus on single actor decisions, organizational capabilities are conceived as collective and socially embedded in nature. They are brought about by social interaction and represent a collectively shared 'way of problem-solving' (Cyert and March, 1963). Accordingly, organizational capabilities can be built in different fields and on different levels of organizational activity, for instance at departmental, divisional, or corporate level.

From a conceptual point of view three characteristics seem to stand out:

Problem-solving and complexity

Capabilities are conceptualized in the context of collective organizational problem-solving. Capable firms are assumed to solve emerging problems effectively. A capability, however, is not attributed unless outstanding skills have proved to have solved extraordinary problems (otherwise competitive advantages could not be built). In most cases extraordinary tasks and skills are understood in terms of complexity (Levinthal, 2000).

The notion of complexity refers to the characteristics of problem situations and decision making under uncertainty (Dosi, Hobday, and Marengo, 2003; Duncan, 1972), addressing ambiguous, ill-structured tasks (March and Olsen, 1976; March and Simon, 1958). Solving complex tasks requires sophisticated abilities with a broad absorptive capacity (Cohen and Levinthal, 1990; Zahra and George, 2002). As is well known from cybernetics, complexity needs complexity (Ashby, 1965). The complexity of a capability therefore reflects the internal requirements for mastering complex tasks. Problem-solving can be defined as a sequence of generating *complex combinations of* cognitive and habitual acts (Dosi *et al.*, 2003: 170). These acts focus primarily on finding all the relevant resources needed and combining them effectively (Kogut and Zander, 1992). Due to its complexity, the organization may effectively solve challenging problems without understanding the inherent logic of its capability; its internal functioning is likely to remain opaque. As organizational capabilities are not the result of planned corporate conduct but emerge incrementally from daily interaction they are often considered as 'somewhat mysterious social phenomena' (Dosi *et al.*, 2000: 1).

Practicing and success

Capabilities are close to action; conceptually they cannot be separated from acting or practicing. At the same time, embedding organizational capabilities in practicing or doing means that capability represents more than explicit knowledge; it covers more dimensions of an action: emotions, tacit knowing, and bodily knowledge (Polanyi, 1958, 1966). Practicing a capability therefore means a 'generative dance' (Cook and Brown, 1999) between explicit and tacit elements.

Furthermore, capabilities are bound to performance; they are conceived as doing something that '*must be recognized and appreciated*' (Gherardi and Nicolini, 2002: 421; Weinert, 2001). They are only recognized and attributed to a performing social entity in the case of a success (as compared to other organizations, which are less capable at reaching such effective solutions). Finally, a single case of successfully mastering a problem situation does not on its own amount to an organizational capability. Actually, the notion of capability refers to habitualized action patterns. Some authors therefore refer to the concept of routines as the building blocks of organizational capabilities (Dosi *et al.*, 2000; Nelson and Winter, 1982; Winter, 2000).

Reliability and time

'At a minimum, in order for something to qualify as a capability, it must work in a reliable manner' (Helfat and Peteraf, 2003: 999). Capabilities represent a reliable pattern: a problem-solving architecture composed of a complex set of approved linking or combining rules. In other words, a set of problem-solving activities is not called a capability unless it has proved to be successful across various situations and organizations are able to reproduce it. As a consequence for an organization the ability to transform an accidentally successful coordination effort into a reliable problem-solving pattern gains critical importance (Hannan and Freeman 1977, 1984). A singular success can trigger the building of a capability but a capability is not actually constituted unless a reliable 'practice' has evolved over time. By implication, an organizational capability is also a historical concept by its very nature, integrating past experiences with the present problem-solving activities and a prospect for future direction of resource allocation.

Stressing the historical nature of organizational capabilities refers to the fact that time is a basic

dimension of capabilities. Capability development comes close to a chain of reactions triggered by an initial event, thereby establishing a capability trajectory. Capability development takes time and the specific way in which time has been taken (i.e., the intensity, frequency, and the duration of social interactions) is relevant for the gestalt of a capability. At the same time the particular importance of this process means that there are no time compression economies (Dierickx and Cool, 1989). It should be reiterated here that it is exactly this time-intensive and not fully understandable evolution that makes up the non-imitable essence of the strategic relevance of organizational capabilities (Barney, 1991; Leonard-Barton, 1992).

Overall, any organizational capability is the result of an organizational learning process, a process in which a specific way of 'selecting and linking' resources gradually develops. Although organizational capabilities apply to various problem situations, they do not apply everywhere. They have been formed through successful responses to specific historical challenges and are thus bound to specific types of constellations (Winter, 2003). Problem-solving is embedded in organizational design, information procedures, micropolitics and communication channels, as well as other organizational characteristics (culture, control-regimes, etc.). All of these features shape organizational capabilities (Henderson and Clark, 1990) and thus define their distinctiveness.

THE PARADOX OF ORGANIZATIONAL CAPABILITIES

Nowadays organizational capabilities are highly valued attributes of firms; organizations want to be perceived as possessing salient capabilities. The competent and capable organization has become a new ideal. From this perspective organizations would be well advised to invest further in their current capability set and to build their strategies upon them.

A closer look at capability-based behavior and competition reveals, however, a much more ambiguous reality than the hymns of praise lead us to expect. The replication of successful and complex selection and linking patterns has its dark sides too. This becomes evident particularly in volatile environments and dynamic competition with changing rules of the competitive game. In

all of these cases organizational capabilities may easily invert from a strategic asset into a strategic burden. The strengths of capability-based behavior and its recursive reproduction can add up to a barrier to adaptation and a burden with respect to flexibility and change. The critical focus is on the inability of organizations to change their familiar 'ways of doing' when confronted with new developments. This inherent tendency to inertia forms the very basis of the recent capability debate resulting in the call for 'dynamic capabilities.' This paradoxical persistence in the face of a changing environment needs further explanation. From our point of view three main causes for the paradox can be identified.

Path-dependency and lock-in: One reason why organizations are often overly persistent in their strategic orientation is path dependence in capability-based activity. Path dependency means first of all that 'history matters' (David, 1985), i.e., that a company's current and future decision capabilities are imprinted by past decisions and their underlying patterns (Arthur, 1989; Cowan and Gunby, 1996). In many cases path dependency means, however, more than mere historical imprinting: it refers rather to forceful dynamics called 'increasing returns' (Arthur, 1983). That is, once successful combinatorial activities generate positive feedback loops, thereby emergently constituting self-reinforcing processes. As is well known from empirical studies (Burgelman, 2002a; David, 1985; Helfat, 1994) such self-reinforcing processes may establish strategic paths which are prone to dramatically narrowing the scope of strategic management. In the worst case a specific orientation becomes locked, i.e., any other strategic alternative is excluded.

The same is true for capability building where positive feedback-processes are likely to bring about path dependency in capability-based practices. In other words, organizational capabilities or core competencies are prone to become fixed to the constellations in which they proved to be successful. If the constellations do not change significantly, this latent fixation does not add up to a problem. In the reverse case, however—and we doubtless live in a world of change (in terms of competitors, market structure, rules of competition, etc.)—new parameters determine competitive success, and the capability-driven action patterns are

likely to bind the organization to the past (and not to the future).

Apart from path dependency, other causes provide additional insight into the paradox of capabilities.

Structural inertia: In their evolutionary framework, Hannan and Freeman stress the importance of the 'unusual capacity to produce collective outcomes of a certain . . . quality repeatedly' (Hannan and Freeman, 1984: 153) for the survival and sustainable success of an organization, insofar as they consider 'organizational inertia' as a precondition for organizational success. Inertia is needed in order to make an organization reliable and identifiable as a distinct unit. It is therefore a requirement for guaranteeing survival.

But, paradoxically, exactly this inertia brings about the risk of maladaptation. In the face of a changing environment, organizations are bound to their stabilized structures and action patterns. Central to survival is the ability to overcome organizational inertia.

Other approaches locate organizational inertia primarily in other mechanisms such as change-inhibiting organizational cultures (for instance, a 'kill-the-messenger-of-bad-news culture'), or micro-political processes (Beatty and Ulrich, 1991; Markides, 1998).

Another stream of literature addresses the capability paradox in the context of organizational learning. The basic findings are that focusing on improvements of existing capabilities makes experimentation with alternatives less attractive (Benner and Tushman, 2003; Henderson, 1993; Levitt and March, 1988; Repenning and Serman, 2002). By exploiting current strengths, there is a tendency to crowd out explorative activities which go beyond the beaten track: 'As organizations develop greater competence in a particular activity, they engage in that activity more, thus further increasing competence and the opportunity cost of exploration' (Levinthal and March, 1993: 106). These exploitation processes not only lead to a fixation to existing capabilities but also prevent the developing of new capabilities or, put differently, 'the pitfall is that this learning increases the rigidity of the firm' (Kogut and Kulatilaka, 2001: 755). Thus capability development resides in the well-known trade-off between exploitation and exploration processes in organizational learning (March,

1991), emphasizing the dysfunctional dynamics of exploitative learning processes.

With the 'Icarus Paradox' Miller points to a similar dynamic thereby referring to the fact that organizations facing a long period of (outstanding) success inherently develop the fatal tendency to (over)simplify their operational procedures and to blind the organization to discrepant feedback (Miller, 1993, 1994). A once successful pattern mutates into its opposite: a pattern of failure. The cause of failure paradoxically resides in what was once the source of success.

Commitment: Further insight into the texture of the capability paradox is provided by the commitment literature, which highlights the binding effects of investments and the resulting persistence of organizational strategies (Ghemawat, 1991). Commitment to a particular strategic thrust is considered the prerequisite for sustained competitive advantage. The argument is advocated from both an economic and a psychological point of view.

The economic dimension focuses on resource investments. On the one hand, firm-specific (and therefore sticky) investments are needed to build heterogeneity and superior performance, i.e., to generate high quality, economies of scale, etc. (Ghemawat and Del Sol, 1998). On the other hand, investments in firm-specific resources are likely to be irreversible and rigid because the cost of separating and abandoning such sticky resources is too high. In consequence, resource commitment tends to restrict an organization's options and flexibility (Bercovitz, de Figueiredo, and Teece, 1996). The more dynamic the environment, the higher is the implied flexibility risk (Winter, 2003). We do not go into more detail here because, as was shown at the beginning, capabilities do not actually represent a resource; they focus rather on the combination and linking of resources. Although there are interactions between them, resources and capabilities represent two different conceptual levels with their own commitment dynamics. The commitment to resources resulting from specific investments should be clearly differentiated from commitments evolving when practicing capabilities. This differentiation accordingly implies a separation of resource-based inertia and capability-based rigidity (Gilbert, 2005). Since this paper is concerned with the dynamization of capabilities, we only address the issue of capability rigidities without denying in any way the relevance of resource inertia.

For understanding commitment dynamics in capability-based conduct, social psychological processes form the main bulk of explanations. Social psychological research stresses the tendency to act in favor of the consented current thought and to avoid confrontation with deviating negative feedback and signals (Miller and Nelson, 2002; Tripsas and Gavetti, 2000). One of the best-known effects in this context is groupthink (Esser, 1998; Janis, 1982), which is likely to commit the group to their perspectives once developed. The commitment driver is the cohesion of the group and the willingness to protect the group against disturbances and disharmonious themes. Another well-known effect fostering an ultra-stabilization of capabilities is 'escalating commitment' (Staw, 1976). The argument draws on psychological sunk costs or the phenomenon that people sometimes 'throw good money after bad'. Although there is a great deal of theoretical controversy concerning the basic causes of escalating commitment, it is predominantly explained as being the outcome of self-justification processes (Festinger, 1957; Staw and Ross, 1978). The tendency to become entrapped within a failing course is explained by the decision-maker's unwillingness to admit that their prior investment (resource allocation) was in vain. The strong urge to 'save face' in their own and other's eyes (Brockner and Rubin, 1981; Brockner, 1992) leads decision-makers to support further insufficient investment thereby (re)affirming the correctness/usefulness of the earlier decision. As a result they start an escalation of commitment which excludes more and more reversibility of the once chosen direction—in our context, a once developed capability.

Similar tendencies stem from other cognitive effects such as self-reinforcing 'selective perception' (Walsh, 1988) or 'mind maps' (Weick and Roberts, 1993), to give just some examples. The point of departure here is the bounded capacity of actors in processing information and the necessary building of selection patterns. Due to reinforcing tendencies these patterns are likely to become trapped. Such processes are the more prominent, the more uncertain and ambiguous the situation is perceived to be. Heiner (1983) stresses the effects of complexity perception: the more difficult it is for an actor to decipher the environmental demands, the more likely the actor will impose familiar patterns of response to match the challenge (also

North, 1990: 23). The same is true for perceived threats.

Persistence of capabilities in the face of changing environmental demands is also caused by socialization mechanisms. Managers become socialized into the belief system in which these capabilities are embedded. Socialization into belief systems that take for granted the current capability pattern and its internal links is likely to mobilize cognitive and emotional resistance against critical signals urging a shift in the familiar patterns of acting. They do not reflect on these deep beliefs, they simply practice them, thereby becoming reluctant to acknowledge the need for changing a once brilliant problem-solving architecture and its underlying coordination pattern (Westphal and Bednar, 2005).

What is still more intriguing is the fact that even when they are aware of the need to change and willing to change capabilities, the hidden imprints of the capability pattern may lead them to look for alternatives only in the neighborhood of the current practices (Johnson and Johnson, 2002). Thus, managers reinforce current capabilities (via project budgeting and investment policy), thereby unintentionally suppressing new unconventional project initiatives (Burgelman, 2002b; Leonard-Barton, 1992).

In order to avoid any misunderstanding, a clarifying remark is appropriate here: while broadly acknowledging the power of inertia drivers, it would be misleading to conceive of organizational capabilities as totally immobile entities. As is true for all social artifacts, capabilities are subject to some alteration processes over time. By drawing on the life cycle concept, Helfat and Peteraf (2003), for instance, point to the gradual evolution of capabilities, which automatically take place in the course of aging (for a similar organic understanding of capability development see Feldman, 2004). This procedural idea of an ongoing process of slight capability development is limited to an organic development and therefore does not dissolve the threatening diagnosis of the flipside of capabilities and self-reinforcing rigidity dynamics.

Paradox implications for capability management

The inherent tendency of capabilities to persist amounts to a strategic threat which cannot be neglected. The management faces a paradoxical

situation: on the one hand, the building of complex and reliable problem-solving architecture constitutes strength and allows for developing sustainable competitive advantages. On the other hand, this advantageous side of capabilities is, however, attained by (unconsciously) suppressing alternatives, pluralistic ignorance and reduced flexibility. Any capability therefore contains an inherent risk, i.e., the risk of rigidity and helplessness in the face of fundamentally changing conditions.

As a consequence, organizations are confronted with a dilemma: on the one side, they have to develop reliable patterns of selecting and linking resources in order to attain superior performance and competitive advantages and on the other side this endeavor constitutes—at least in volatile markets—a considerable risk of becoming locked into exactly these capabilities. How can this paradox be resolved?

The problem of locked organizational capabilities has been addressed in many ways in recent strategy literature. However, the very first step necessary is obviously to identify and to confront the Janus face of capability, its strengths and weaknesses. Whatever the approach in detail, it has to address the causes and drivers underlying the capability paradox: our analysis suggests that these paradox drivers are primarily path dependency, structural inertia, and psychological commitment (cognitive traps).

The most salient suggestion to overcome the capability paradox within the capability debate is to develop ‘dynamic capabilities’ (Eisenhardt and Martin, 2000; Kusunoki *et al.*, 1998; Teece *et al.*, 1997; Zollo and Winter, 2002; Winter, 2003). In the following section we examine to what extent the fascinating idea of developing dynamic capabilities can actually provide a solution to resolve the capability–rigidity paradox.

APPROACHES TO DYNAMIC CAPABILITIES

At first sight the approaches on dynamic capabilities build a fairly homogenous class. A closer look, however, reveals remarkable differences among them calling for a differentiated discussion. From our point of view, three different theories of dynamic capabilities can be identified. We have labeled them (1) the radical dynamization approach, (2) the integrative approach, and (3) the

innovation routine approach. The first treats dynamic capabilities as a functional equivalent to classical capabilities in dynamic environments. The second fosters the idea of amending capabilities by adding a dynamic dimension and the last assigns the task of dynamization to a special type of routine called innovation routine.

Radical dynamization approach

The core idea of total dynamization is to transform the conception of capabilities into full-blown adaptability—at least in high-velocity markets. Based on a differentiation between different degrees and patterns of dynamic capabilities, a contingency approach of dynamization depending on the degree of market dynamic is advocated (Eisenhardt and Martin, 2000). A clear distinction is drawn between moderately dynamic and high-velocity markets. Accordingly, two broad classes of dynamic capabilities are introduced. ‘Moderate dynamic markets’ require dynamic capabilities, which come close to the classical conception of capabilities, i.e., the pattern-driven conception of problem-solving with some incremental changes. The real challenge, however, is seen in the second case, namely mastering high-velocity environments with rapidly and discontinuously changing market conditions and rules (Bourgeois and Eisenhardt, 1988). Radical dynamic capabilities are conceived to master this volatility. The linking and selection process has to continuously create new combinations of resources: ‘They are in a continuously unstable state’ (Eisenhardt and Martin, 2000: 1113). Dynamic capabilities in this sense build different types of capabilities, which amount to experiential, improvisational, and highly fragile processes of reconfiguration, integration, and acquisition of resources. They make use of real-time information, simultaneously explore multiple alternatives, rely on quickly created new knowledge, are governed by very few simple rules, do not get stored in the organizational memory, and thus do not produce predictable outcomes. Their strength no longer flows from architecture but rather from its ability to continuously produce new constellations and solutions. The new basis for building competitive advantages is seen in the encompassing capability to change very quickly and to master unforeseeable environmental demands (Eisenhardt, 2002).

Quite obviously, this conception of dynamic capabilities comes very close to the functioning of what is known as adhocracy (Mintzberg, 1979) or the 'total learning organization' (Pedler, Burgoyne, and Boydell, 1991; Vaill, 1996). The distinguishing characteristic of the learning organization is that all activities permanently operate in the learning mode, i.e., they are not bound to history/experience or any rules. The learning organization is always ready to revise hitherto cognitions and change expectations; they are in flux or, as Weick (1977) puts it, they are 'chronically unfrozen'.

Discussion

This solution to the capability paradox in high-velocity markets is a radical one. The subject to be dynamized is in danger of getting lost as actually the generation and reproduction of capabilities are no longer needed or even become dysfunctional. The only organizational capability left in high-velocity markets is the ability to learn quickly and to improvise effectively. Problems are solved without relying on previously built expertise and competitive advantages can only be gained from rapid learning and flexible pacing (Eisenhardt and Martin, 2000: 1116).

This conception of dynamic capabilities is without doubt an appealing one, which nicely matches the prevalent feeling that all parameters of our life are continuously changing. From a theoretical point of view, however, the suggested type of organization and its functioning raises some fundamental questions.

The major concern addresses the logic of such flexible organizations. A total learning system, as suggested in this approach, is supposed to react to any signal from a volatile environment in a new way. Organizations could no longer observe and handle environmental developments on the basis of proven selection patterns and operating rules. The handling would have to be created case by case from scratch without any guidance from the past and experiences of successful practices. Actually this approach advocates spontaneous acting throughout the system. Any capability structure for guiding the development of these activities would hinder the advanced full flexibility. However, it is hard to see how organizations can build resource heterogeneity and sustainable superior performance on this basis. The working of such improvised solutions cannot be anticipated

because they are supposed to be new each time and thus there are no experiences that allow for properly assessing the effects of the new solutions. The success of mere spontaneous reactions is likely to depend on mere luck and/or intuition only. Obviously, this mode of adaptive acting does not meet in any way the basic dimensions of a capability as outlined at the beginning of this article. Similarly, Winter (2003) points out that such streams of newly created activities and spontaneous adaptations cannot be understood as exercising capabilities; rather they represent a completely different mode of acting and practicing, namely ad hoc problem-solving.

Winter (2003) holds, however, that the mode of ad hoc problem-solving can be considered as a functional equivalent to building (dynamic) capabilities. In his view organizations, in volatile circumstances, are well advised to calculate whether ad hoc problem-solving is—compared to capability building—the preferable option since it does not require longer-term investment in resources. It is, however, hard to see that this is really a viable option. How should an organization exist without any investments in tangible and intangible assets and any specific patterns of doing business? It is even harder to see how this mode of acting could amount to a sustainable advantage. Rather it raises the more fundamental question as to why this type of coordinating activity should be conducted within the realm of an organization. Actually, the logic of mere ad hoc problem-solving comes so close to the (unpatterned) mode of market coordination that the boundaries blur. Ultimately, the mode of total flexibility (ad hoc problem-solving) eliminates the very reason for creating organizations/hierarchies instead of market coordination (Williamson, 1975). There is no rationale why ad hoc problem-solving in organizations should outperform market coordination.

Modern systems theory (Luhmann, 1995) and cognitive schools of organizational thought (e.g., Daft and Weick, 1984; March and Simon, 1958) can provide further insights to substantiate this argument. They all see pattern building and structuring as both preconditional and being the actual motive for creating and maintaining organizations. Their argument starts with environmental complexity and ambiguity and the requirement to provide orientation by developing workable schemes for enabling action. Volatile environments do not appear on the 'organizational screen' in terms of

clear-cut problems; rather actors must actively construe models for understanding and deciphering the complex world in order to survive. Collective actors/organizations are considered to provide superior schemes, which is ultimately the reason for their existence. Organizations have to safeguard and cultivate their knowledgeable and actionable schemes to guarantee effectiveness. At the same time the safeguarded schemes form the organizational boundary by drawing a distinction between inside and outside. If organizations refrained from doing so, they would simply merge with the environment after having solved a specific problem. The distinction, and thus the boundary, would vanish as there is no such thing as a boundaryless organization. A world of fully dynamized 'capabilities' would come close to a world without organizations.

A similar argument can be drawn from educational psychology (Carroll, 1993; Piaget, 1970). Research has shown how learning is structurally bound to the existence of cognitive patterns or mental maps. They are simply the precondition for perceiving and thinking and subsequently for learning. The lesson is that there is no unconditioned observation and perception. In the same way, to be able to act and to learn, organizations need their own sense-making patterns to reduce environmental complexity to an appropriate level.

As shown in the first section the notion of organizational capability essentially builds on patterns and maps. Furthermore, it is the very function of a capability to enable an organization to skillfully get along with these complex challenges from a volatile environment and possibly provide a platform to master these challenges in a better way than competitors are able to. The most surprising conclusion from this discussion therefore is that a full-blown dynamization of capabilities means in the final analysis not only eliminating the operating basis of an organization but also to drop the idea of capability building. If there are no patterns, no organizational memories, and no assets then there is no basis to grow for any capability at all—irrespective of whether we address classical or dynamic capabilities (Helfat and Peteraf, 2003).

Eisenhardt and Martin (2000) are quite aware of this radical consequence. Relying on complexity theory they seek to find a way out of this dilemma by stressing the necessity for some minimal structures and a few simple rules. A critical number of

routines and rules are assumed to prevent organizations sliding into chaos or dissolution. But this suggestion raises subsequent questions. By pursuing the claim for (minimal) structures and (simple) routines systematically, it becomes very hard to draw the line as to where the dynamic conception ends and the classical conception of capabilities begins. To make this suggestion operational, these structures and rules would have to be properly defined. At a minimum they must work in a reliable and repeatable manner. In other words, taking the suggestion of minimal structures and routines seriously brings us back to the familiar evolution of pattern-driven problem-solving. The difference between the classical capability conception and the radical dynamic capabilities (as well as ad hoc problem-solving) would become a matter of (uncertain) degree only, and no longer a radical departure.

Integrative approach

The most prominent approach towards a theory of dynamic capabilities has been provided by Teece *et al.* (1997). It is the most salient one among various attempts of in-built flexibility. The authors do not start with the paradox introduced above; rather, they refer to empirical evidence finding competitive advantages to be primarily accomplished through responsiveness and flexible product innovation. Successful organizations proved flexible in terms of 'dynamic capabilities'. Dynamic capabilities are conceived to be the mechanisms of adapting, integrating, and reconfiguring integrated clusters of resources and capabilities to match the requirements of a changing environment: 'The term "dynamic" refers to the capacity to renew competencies' (Teece *et al.*, 1997: 515).

More precisely, dynamic capabilities are conceptualized by three dimensions: (1) positions, (2) paths, and (3) processes:

1. '*Positions*' refers to both internal and external positions. The internal position relates to the specific set of resources available in a firm (financial, technological, reputational, and structural). The external side refers to the specific market position/assets of the focal firm. The current position of a firm determines to a certain extent the future decisions a firm can reach and realize.

2. 'Paths' represents the history of an organization; i.e., the current position of a firm is basically shaped by the patterns evolved from the past. And also, where a firm can go in the future depends on its current paths and their shaping force.
3. The dimension 'processes' is at the heart of this capability conception and is twofold. On the one hand, processes are devoted to coordinating and integrating available resources. This is understood as being the static component. On the other hand, processes refer to organizational learning and the reconfiguration of resources. The latter two sub-dimensions represent the dynamic component, which is supposed to guarantee permanent adaptation and change of the organization. The dynamic sub-dimension 'learning' covers both processes of incremental improvements (amendments of the current positions) and processes of identifying new opportunities. The second dynamic sub-dimension 'reconfiguration' addresses the transformation of a firm's asset structure accomplished through alert surveillance of the environment for discontinuities and subsequent radical changes.

In successful firms, the interaction of these static and dynamic components is assumed to converge to a full-blown 'dynamic capability'. In order to avoid any misunderstanding, it seems important to stress that here the term 'dynamic capability' explicitly comprises both dynamic and static elements, which is the very reason we call it the 'integrative approach.'

Discussion

Without doubt, the idea of integrating dynamic mechanisms into the concept of capabilities offers a very plausible reaction to the problem of the capability paradox. In our view, however, it is at least questionable as to what extent this idea of integrated dynamics can actually provide a way out of the paradox and its underlying conceptual dilemma. The core idea of the suggested method of dynamizing capabilities is to expand the scope of the construct by including learning and transformation processes. The new dynamic features are added to the two more static dimensions of the problem-solving architecture in order to inject the missing flexibility. The guiding logic seems to be

the following: the classical patterns of organizational capabilities—complex problem-solving and appreciated practicing which is reliable—build the core. The additional dynamic dimension is designed to overcome the inherent risk of becoming rigid and trapped.

The authors suggest 'reprogramming' organizational capability as a two-dimensional notion consisting of both a stable and a dynamic dimension. In other words, the integrative approach tries to be two things at once: it focuses on exploiting the positive effects of patterned capabilities and simultaneously overcoming its inherent problematic side by adding a dynamic dimension.

In our view, this approach tends to underrate the inertial dynamics of organizational capabilities. It builds on two contradictory notions of logic at the same time: reliable replication and continuous change—two dimensions that hardly mix. Dynamizing in the defined sense attempts to transform reliable and routinized action patterns into flowing operations. Stable patterns are thought to provide their reliable service while at the same time continuously changing. Reliable and replicable patterns cannot, however, evolve without stabilization; patterns cannot be conceived in terms of continuous change. Making them subject to the continuous adaptation inevitably means dissolving their replicable essence. The very core of a capability—as defined above, as well as by Teece *et al.* (1997: 519): 'distinct ways of coordinating and combining'—would simply get lost and become substituted by a chain of subsequent singular and patternless acts.

Obviously, the idea of adding the learning function to the capabilities concept, which at first glance seemed very plausible, runs into a serious theoretical problem. In terms of a consistent theory it is not possible to simply add the missing dynamic feature as the two dimensions are contradictory in nature. To stress the one dimension necessarily means negating the other—at least to a significant degree.

It should be noted, however, that Teece, Pisano, and Shuen are sensitive to this conceptual implosion. They try to attenuate the dissolving effect of adding a dynamic dimension by qualifying the penetrative power of the learning function. They stress that learning has a tendency to be local and close to previous activities (Teece *et al.*, 1997: 522). Following this line of thought, the scope of innovative action would be constrained by the past

and by historical paths. Furthermore, the authors point to economic reasons for limiting the number of changes: 'Change is costly' (Teece *et al.*, 1997: 521). These arguments, however, easily lead to fostering small-scale, incremental changes. Path-driven learning and small-scale transformations are only likely to modify the established method of patterned problem-solving and to focus on fine-tuning, similar to the evolutionary stage in the framework of Tushman, Newman, and Romanelli (1986). As a consequence, the basic assumptions and values underlying the predominant capability pattern are not called into question and a fundamental change or renewal of the existing capability cannot occur. But precisely this fundamental transformation is regularly claimed to be the most important function of dynamic capabilities.

In conclusion, the idea of building an integrated conception of dynamic capabilities by simultaneously relying on both patterned replication and the learning function is likely to conceptually implode. The attempt to merge continuous learning *into* the capability conception inevitably leads us back to the paradox; the suggested integration logic obviously overstretchers the capacity of the conception of capability. Thus, the question arises as to whether the term 'dynamic capability' does not inevitably lead to a contradiction in terms.

Innovation routines

The third approach to dynamizing capabilities basically suggests supplying the missing dynamic dimension by installing separate innovation routines that allow a firm to overcome the rigidity trap (paradox) of organizational capabilities (Nelson and Winter, 1982; Zollo and Winter, 2002). Innovations are defined as the creation of any sort of novelty which, focusing on capabilities, means the creation of novel problem-solving patterns. Innovation routines are characterized as organizational procedures directed towards change: 'A dynamic capability is a learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness' (Zollo and Winter, 2002: 340). In the case of volatile environments—then and only then—the organization is well advised to build (or accept the evolution of) higher-order search routines in order to bring about regular modifications of established operating (lower-order) routines. Such innovation

routines, somewhat similar to the Japanese system of continuous improvement, are expected to produce revisions, even radical changes, in a systematic and predictable fashion (Nelson and Winter, 1982: 17). This approach also includes the explanation of the genesis of routines. Both operating and innovation routines ('dynamic capabilities') arise from learning and are conceived as condensed results of former trial-and-error behavior in terms of collective learning acts. Zollo and Winter therefore suggest establishing separate 'learning mechanisms' to develop a firm's routines. These learning mechanisms are specified as stages in a recursive cycle of 'experience accumulation,' 'knowledge articulation,' and 'knowledge codification'—a specification which comes close to Nonaka's knowledge spiral (Nonaka, 1994).

This interesting contribution has considerably advanced the discussion on the nature and merits of 'dynamic capabilities.' The major distinguishing feature is its emphasis on the notion of innovation routine. A discussion of this contribution therefore has to focus on this core element. The major question is whether or not separated innovation routines actually provide a promising avenue for overcoming the capability trap and conceiving organizational dynamics.

Discussion

Routines are doubtless at the heart of the classical capability conception although, as shown above, a capability is supposed to consist of much more than interlinked routines. Replicable clusters of problem-solving activities constitute an organizational capability and inevitably concurrently produce the inherent risk of entrapment. The idea here is to overcome the risk of getting trapped in changing environments by installing another routine or set of routines directed to modify (operating) routines. Whatever the specific subject and the level of routines, the very logic of their functioning is always the same: they replicate and stabilize recursively a pattern of activities. Construing the dynamization of capabilities within this conceptual framework means to duplicate the same structure or architecture on a different (higher) level. As the capability paradox has been shown to result from inherent structural dynamics (simplification, selectivity, etc.), such duplication is prone to evoke on a higher level the same set of problems which

dynamic capabilities set out to overcome. Innovation routines (and the ‘learning mechanisms’ too) are conceived as ‘stable patterns’ of collective activity, which means they inevitably shape attention, learning, and action within a predefined framework, thereby replicating a programmed type of thought and problem framing. Their underlying logic simply does not allow transcending the inscribed program—otherwise they would no longer be routines. In sum, it is hard to attain innovation through routines.

Innovation routines are thus likely to bring about the same form of inside world, which has been identified as an element of the capability trap. The empirical findings by Leonard-Barton (1992) confirm this conclusion. Her study focused on the evolution and working of capabilities in R&D—product development in particular—showing that it was precisely innovation routines that brought about the risk of a dysfunctional capability flip and the fatal restrictions in exploring the scope of alternatives. The trouble comes from the logic of functioning: the effectiveness of (innovation) *routines* is bound to the recurrence of a specific situation or problem structure. The tasks and challenges (innovation requirements) are studied again and again within the preprogrammed framing. This is promising as long as new signals do not ask for radical frame-breaking changes; i.e., it works for familiar triggers but not for surprises and discontinuities. In high-velocity situations not only is the pace high, but rather the type of environmental signals is likely to be new and unpredictable in nature as well, with routines by their very character being not suited to meeting these extraordinary requirements.

Zollo and Winter are quite aware of this problem and try to escape this rigidity trap in unpredictable environments by requiring dynamic capabilities and learning mechanisms ‘to be updated repeatedly’ (Zollo and Winter, 2002: 341). Such ‘updates,’ however, can definitively not be accomplished again by routines, but only by frame-breaking approaches which are beyond the routines’ program. In dynamic and complex environments the suggested ‘learning mechanisms’ cannot fulfill this function to the necessary extent because they are again based on routines. The specified set of learning routines for accumulating experience, articulating hidden knowledge, and codifying knowledge has the same grammar of programming. This obviously brings us into a loop with a frame-breaking routine, which amounts to a contradiction in terms. Whatever level we approach the essential logic always remains the same, namely that routines are likely to concurrently turn valuable capabilities into rigidities.

Summary

In summation, the discussion of dynamic capabilities reveals the following picture: all approaches highlight a dynamic feature of organizational capabilities and the need for changing capabilities in order to address dynamic markets. The *way in which* the dynamization is conceptualized differs primarily in terms of the favored learning direction, the basic mechanism of dynamization, and the specific emphasis on organizational routines. Table 1 summarizes the logic of the three approaches from a comparative view.

Table 1. Comparison of approaches on dynamic capabilities

	Radicalized dynamization approach	Integrated dynamization approach	Routinized dynamization approach
Dominant learning direction	<i>Experiential</i> (ahistorical) learning	<i>Historical</i> learning within the frame of capabilities	<i>Historical</i> learning within the frame of innovation routines
Mechanisms of dynamization	<i>Regimes</i> of ad-hoc problem-solving processes	<i>Processes</i> internal to capability	<i>Processes</i> external to capability
Importance of routines	<i>Low</i> : Avoid routines as far as possible	<i>Medium</i> : Build routines and paths	<i>High</i> : Build multiple level of routines
Capabilities in the context of RBV	<i>Paradigm change</i> : Capability as strategic resource obsolete	<i>Paradigm modification</i> : Capability as dynamic strategic resource	<i>Paradigm variation</i> : Capability as strategic resource Meta-capabilities as medium for dynamization

The discussion of the approaches revealed some irritating contradictions, raising doubts whether the notion of dynamic capabilities actually provides the most promising avenue for overcoming the capability paradox.

Three conclusions are salient. A first result is that capabilities cannot be thought of as being fully flexible; this would mean overstressing the scope of the conception. Whatever the perspective, a capability refers to patterned and replicable activities oriented toward specific tasks (see also Winter, 2003: 992).

A second result is that overcoming the capability paradox calls for frame-breaking changes and not only incremental steps. Due to the fact that organizational capabilities are likely to stick to their underlying logic, a real dynamization in the face of changed market conditions has to bring about higher-level changes.

A third result is that alternatively conceptualizing dynamic capabilities in terms of innovation routines does not yield a fully convincing solution to the paradox either. This approach bounds the dynamization to the execution of routines and is therefore likely to restrict the scope of change to the logic of familiar programs.

How to overcome the blind alley

As, on the one hand, the solution of dynamic capabilities seems to lead to contradictions and, on the other hand, dynamization of capability-based management is imperative, it might be advisable to look for structurally different solutions beyond overstressing the conception of capability and underrating the necessity of frame-breaking changes. In the next section we aim at developing a solution with a different set of logic. It conceives of organizational capabilities and dynamization of the problem-solving architecture as two *separate* functions that a successful organization has to address simultaneously. At the core is a dual model of capability management which is based upon *countervailing processes*. Our conception draws on the three-step model of strategic control developed by Schreyögg and Steinmann (1987).

ORGANIZATIONAL CAPABILITIES AND DYNAMIZATION: A DUAL PROCESS MODEL

In a nutshell, the basic idea we are suggesting is counterbalancing patterned selection (capability)

and risk compensation. The guiding idea is to exploit on the one hand the power of patterned problem-solving and on the other hand to *compensate* for its inherent risk of dysfunctional flip by installing alert environmental surveillance designed to give early indication of any unexpected change necessities. Instead of dynamizing the capability conception, capability evolution and system dynamization are conceived as two separate *countervailing processes*, which are performed simultaneously.

The logic of dual processes

The point of departure is the conclusion that, as *opposed* to the idea of a dynamic capability, the strengths of patterned problem-solving and dynamization cannot be merged into one conception. Our proposed approach therefore favors a policy of keeping the two strategic functions separate and treating them as countervailing forces. Such endeavor requires first of all shifting the perspective from the capability level to the systems level. This is because we need an encompassing perspective, which allows for conceiving two separate processes that complement each other in order to secure the system's survival and its enduring success. From a systems theory point of view (Luhmann, 1995), capability building and dynamization cannot only be treated as two separate system functions but can also be conceived of as countervailing processes designed to manage the contradictory requirements of exploitation and exploration (fundamental change). Since one and the same process cannot comprise concurrently stabilizing and destabilizing forces, the processes of organizational capability evolution and development have to be temporarily and locally deskewed (Antonacopoulou and Tsoukas, 2002). By conceptually deskewing practicing from *reflecting on* practicing, the practice of an organizational capability can be maintained within its logic of functioning since a reflection process separated in time and space deals with the adaptation of the patterned practice as part of a permanent interaction between organization and environment.

Risk compensation through monitoring

Organizational capabilities provide a problem-solving architecture, which enables the organization to make sense out of an ambiguous

unpredictable environment and to master complex tasks in an effective and replicable way. To make use of these advantages implies that only a limited set of procedures can be employed repeatedly, while at the same time potentially available alternatives are (consciously and unconsciously) excluded (Winter, 2003). Thus capabilities are selective by their very nature.

This inherent selectivity of capabilities (including dynamic capabilities in terms of innovation routines!) brings forth a structural risk, namely the application of traditional patterns to new tasks. Furthermore, the closing dynamics of recursive replication of once successful problem-solving architectures are likely to render the system ignorant of fundamental change requirements and ways of mastering the new challenges. Discontinuities, misapplications and ignored events are likely to threaten the system's survival. Thus this inherent threat has to be skillfully observed and kept under control. In other words, a system cannot focus only on developing and exploiting capabilities—it must simultaneously find ways to handle the inherent risk of relying on selective and recursive practices. Risk compensation therefore amounts to a separate high-ranking system function, which takes care of change requirements and adaptation needs evolving from unpredictable environments. To put it differently, dynamization is accomplished by risk

compensation. In conclusion, at the heart of successful capability management stands the balanced duality of patterned selection and dynamization through compensation.

Dynamization through compensation means firstly monitoring the system's capabilities, its evolvment, its usage, its effects inside and outside the organization, as well as critical issues and discontinuities in the system's environment. By continuously observing (scanning) the capability landscape, its practices, recursion, blinders, potential failures and maladjustments can be identified—preferably at a very early stage. By becoming aware of these critical signals the issue of potential change requirements is put on the agenda of organizational decision making. This system presses itself to make a decision as to whether or not the approved problem-solving architecture should be abandoned.

Obviously the suggested monitoring changes the internal status of capabilities. Instead of automatic replication they become an explicit issue in a way which is alienated from the taken-for-granted world. From an organizational point of view, installing monitoring requires self-observation as the organization has to observe in a separate process its own practices and the effects of its capabilities in light of a discontinuous environment.

As depicted in Figure 1 the monitoring process looks at the practice of capabilities from a

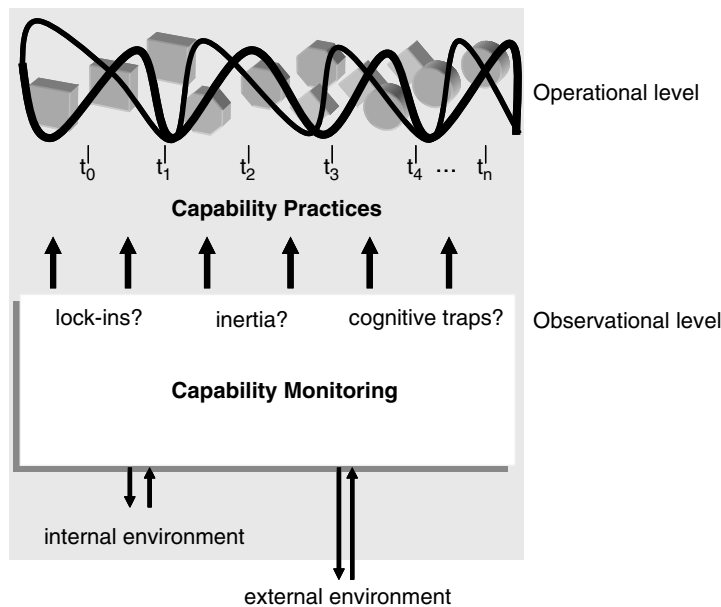


Figure 1. A dual-process model of capability dynamization

non-practicing point of view; i.e., it is primarily designed as a modus of reflection (and not direct acting). The reflecting activity we have in mind is a 'second-order observation' in terms of second-order cybernetics (von Foerster, 1982), i.e., an observation of first-order observations located at the operational level.

Following Maturana's (1970) insight: 'anything said is said *by* an observer,' we can understand any practice as an observation—more precisely as a first-order observation. The monitoring suggested here is conceived of as a second-order observation, i.e., an observation of first-order observers (practitioners). In organizational capabilities, distinctions are drawn and replicated without being aware of them. These distinctions thus amount to the blind spot of any first-order observer. This blind spot can be seen by second-order observation processes only. By asking how the distinctions are drawn, second-order observation puts the framing of first-order practice into perspective (Antonacopoulou and Tsoukas, 2002; Luhmann, 1993; Giddens, 1984). In order to compensate the risk of a dysfunctional flip or to reside in a capability trap, the modus of a second-order observation is a necessary precondition. This observation process can potentially provide the organization with 'enriched' irritations. By observing the processes of linking resources (organizational capabilities) and the underlying distinctions, the focal organization gains insights, which—due to the different frame of reference—differ from the observations on the operational level.

Second-order observation is not part of this first-order acting-practice. For a moment, through second-order observation, the organization takes time out in order to reflect on the reasons for a specific way of doing something.

Quite obviously, second-order observation comes close to 'double-loop learning' or, as it is called by March, 'explorative learning' (Argyris, 1976; March, 1991), focusing both on the basic assumptions and the blind spots of organizational activity. Double-loop learning calls into question the 'theories-in-use' which guide performance through selection and linking processes (capability) where the 'certain way of doing things' is made the subject of extraordinary reflection and thereby opened up to changes responding to discontinuous events (Argyris and Schön, 1978).

To put it differently, through this type of reflection capabilities lose their taken-for-granted

status and become reframed as potentially revisable (Putnam and Majia, 1992; Tversky and Kahneman, 1981). Monitoring brands replication practices with an index of uncertainty. As a consequence, the validity and temporality of capability steadily becomes a critical issue during the strategic discourse, thereby keeping the system alert to required change.

Non-routine dynamization

From a managerial point of view the monitoring of organizational capabilities is a separate function to be executed using its own logic. By continuously checking whether and why the capability-driven activities still apply or registered signals are likely to threaten the validity of the capability in the future, the firm gains flexibility and adaptability.

At first glance, it might appear that the advocated second process of monitoring is similar to the idea of establishing innovation/search routines. If the monitoring process is to succeed as part of the dual model outlined above, it has to be designed extraordinarily and the basic requirement is to keep the process open. Opposed to the idea of innovation routines, we deem that monitoring should aim at refraining from any routinization. As has been shown, routinization means programming, and programming means selectivity and narrowing the scope. Routinization thus hampers the process and counteracts the logic of compensating for the risk of stable competence patterns. As argued above, the *logic* of capability monitoring has to set a counterpoint to the logic of routinization by opening the scope, which has been narrowed by the problem-solving architecture. Only then is there a good chance of detecting extraordinary, unforeseen signals which may call into question the ongoing validity of the current competence patterns. As nobody can know in advance *which kind* of signals or events occur and *where* they show up, any prestructuring in terms of general rules is likely to blind the observers. Due to the incidental and potentially unfamiliar character of the threatening situation, the deliberate installation of routines is likely to mislead the organization in new and unfamiliar situations (as, for instance, Weick, 1993, demonstrated in his well-known analysis of the Man Gulch disaster). Routines reflect familiar problem situations and their solutions and not the handling of unknown events.

To guarantee a firm's responsiveness and flexibility the scanning process therefore has to be in flux.

It should, however, be pointed out that registered discrepancies or rigidities are not supposed to automatically lead to actual change activities. Rather, the organization always has the option to change the method of selecting and linking resources, or to stay with the established patterns. It should be pointed out, however, that this dichotomy represents only an ideal and simplified type of organizational behavior. In reality a variety of change options exist, differing in extent and intensity. They reside in the area between the two extremes: total change at the one end and staying with established problem-solving architecture at the other end. The dual-process model thus replaces the unrealistic idea of permanent transformation with the idea of a combination of learning to change and learning to stay (Schreyögg and Noss, 2000). In many cases, there are good reasons to stay with the established capability patterns, notably that the threatening signals may not be strong enough, potential negative effects too vague, change costs too high, or the firm perceives good chances of changing the threatening context in such a way that the established capability remains valid (e.g., a change in the competitive rules or the acquisition of competitors).

Quite obviously, the risk of capability building, as such, cannot be eliminated by the suggested monitoring, as patterning always bears a risk. But it can provide a measure to contain it at an acceptable level. The risk level varies to a certain degree with the intensity of monitoring efforts. As monitoring efforts are costly, there is no general rule saying that the greater the amount of monitoring, the better is the organization's performance. In some cases it might be advisable for cost reasons to accept a higher level of risk.

Furthermore, it should be noted that the advocated idea of monitoring implies that evolved patterns of organizational capability are reversible and not completely congealed. While being deeply embedded in organizational practices and rooted in paths, capabilities as linking practices proved to be subject to change interventions—at least in most cases (Argyris, 1990; Schein, 1985). Otherwise capability monitoring would not make much sense as the reframing of organizational capabilities would be impossible.

The design of capability monitoring

When executing the model of capability monitoring, it should first of all be taken into account that any monitoring needs a frame of reference in order to produce information. As capabilities usually evolve over time in the context of complex and partly implicit experiences, organizations often lack a well-articulated understanding of their own capabilities. As shown above, organizational capability is successfully practiced but rarely reflected. As a consequence, as a first step in setting up the monitoring, the capability in use and their critical indicators have to be identified in terms of (1) complexity, (2) practice, and (3) reliability, and brought into an observable format. Techniques that can help here are, for example, 'cognitive mapping', 'conversational analyses' or 'pattern recognition' (Ambrosini and Bowman, 2002; Henderson and Cockburn, 1994; Johnson and Johnson, 2002).

The actual *observation activity* focuses on both the internal and external environment (Aguilar, 1967). The field to be observed is endless and thus not ultimately identifiable; the environment, as opposed to organizations, is boundaryless (see Luhmann, 1995). The surveillance is supposed to address first of all the possible paradox-drivers identified above: (1) path dependency, (2) structural inertia, and (3) commitment. This threefold focus can be used for scanning the group, the unit, the division, and the corporate level, and possibly the cross impacts among these. Figure 2 summarizes the features.

Since the scanning can never be all encompassing it becomes inadvertently selective in its own part too. The resulting danger of overseeing signals and missing incidents is, however, limited by the fact that missed critical signals from the internal and external environment do not stand still, but evolve as they finally manifest themselves as a crisis. In other words, missed signals bring about a focus by themselves when they literally become felt in terms of a crisis.

As crises are strong signals at a very late stage, the range of options may be dramatically reduced. The 'best' options may no longer be available at that late stage. Therefore, monitoring should aim at detecting crisis signals as early as possible. From research on detecting crisis signals, it is known that crises are regularly preceded by weak signals. Organizations should therefore become

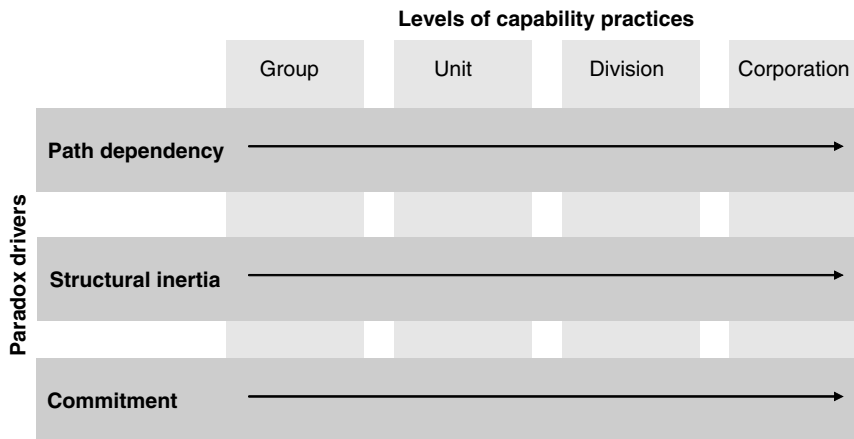


Figure 2. The focus of capability monitoring

skilled in recognizing weak signals and at properly interpreting them (Ansoff, 1976; Hensgen, DeSouza, and Kraft, 2003; Sheaffer, Richardson, and Rosenblatt, 1998). The observation should be kept as open as possible and the interpretation of the incoming signals and triggers should be run as ad hoc problem-solving. The organization has to nurture improvisational skills to deal with surprising signals and events (Mendonca *et al.*, 2004).

While establishing search routines generally counteracts the compensating function of the monitoring process, in interpreting and handling threatening signals some rules might be helpful nevertheless. For the interpretation of signals a system of checks and balances proved to be useful, as well as the use of dialectical principles (Pearson and Mitroff, 1993; Preble, 1997). For getting a handle on pressing signals the installation of alarm systems proves to be useful in many fields. These systems are designed to ensure a quick response by the organization. Well-known systems are 'war rooms,' 'distribution lists,' or a 'red telephone' (Weick and Sutcliffe, 2001).

The foregoing discussion on organizing and managing the task of monitoring also implies that capability monitoring cannot be assigned to a single specialized position or department. It needs rather to be managed as a broadly scattered activity across the entire organization. This requirement not only echoes the open character of the compensating function but also results from the fact that it is unknown where and in which context the relevant information enters the firm (Schreyögg and Steinmann, 1987). In principle, any (sub)unit and member of an organization may come into

the situation where they are confronted with a most important signal of the threatened validity of the current capability. The scope of possibilities is extremely broad, ranging from international conferences, customer claims, negotiations with suppliers, and accreditation auditors to reading a newspaper or having a conversation with a partner in a golf club. It would therefore be misleading to prestructure the activity with operating rules as managing the process rather means to encourage and motivate all units, subunits, and members of the organization to actively participate in the capability monitoring process.

The suggestions provided so far may evoke the impression that implementing a capability monitoring system is primarily a question of technical design. We know, however, from many similar control systems that such activities are likely to become subject to various organizational dynamics such as political processes, cultural bias, and emotional resistances. There is evidence that organizations may fail to assimilate critical signals on current capabilities and to develop responses to them because of deep emotional involvement (Gilbert, 2005). Another cause for missing signals from surveillance activities is the power structure and maneuvers to conserve it. Critical signals on the validity of current practices more often than not are experienced as a profound critique of those authorities who have developed and advocated the method of doing business and gaining competitive advantages in question. They not only feel humbled by critical surveillance activities but also threatened in their position by anticipating the erosion of former competence attributions,

loss of resources, and reputation, etc. Members of the power structure therefore often launch indirect threats and intimidating messages to keep the stream of critical signals under control. Also, those who do not obey and communicate actively critical signals may have to experience punishments in the form of social distancing (Westphal and Bednar, 2005), diminished chances for promotion, or being messed around.

All of these tendencies may hamper the willingness of organizational members to participate in the badly needed alert surveillance activities. Any effective design of a monitoring system has to take such tendencies into account and counteract such adverse effects. There are many measures available. The most important is to institutionally reflect on those activities and to establish self-critical forums to search for such tendencies, e.g., by inviting outsiders to challenge familiar ways of transferring and interpreting critical signals, the application of six-eyes principles, encouraging devil's advocacy, and authentic dissent (Mussweiler, Strack, and Pfeiffer, 2000; Nemeth, Brown, and Rogers, 2001). A great deal can be learned here from the way certified auditing agencies deal with their own 'rigidities' experienced in the past (Herrbach, 2001). A very important provision is to develop a supportive context, which facilitates the dual-model logic. For example, an organizational culture and structure that accepts no-sayers and mavericks (Nystrom and Starbuck, 1984; O'Reilly and Tushman, 2004) and stresses the importance of a high customer and competitor orientation (Atuahene-Gima, 2005). These measures are as important for effectively managing capability monitoring as installing surveillance systems and building up scanning procedures.

CONCLUSION

The suggested dual-process model is designed to manage the paradoxical side of organizational capabilities which is likely to turn effectiveness into rigidity. The model advocates developing two countervailing processes, namely the recursive practicing of distinctive organizational capabilities aiming at excellence and efficiency, and simultaneously the reflexive monitoring of these capabilities in order to check their ongoing workability in the light of a potentially changing unpredictable environment. This observation activity is expected

to initiate a capability change if necessary. The former process fosters the regular exploitation of an outstanding capability and the other destabilizes this practice by continuously calling into question its ongoing environmental fit. The dual-process model is designed to capture both the bright and the dark side of capabilities. The organization is expected to skillfully handle the two countervailing system functions primarily by separating them in space and time. The balancing of two sets of logic has been suggested as a response to attempts aiming at integrating dynamics into capabilities, which in our view eliminates or overstretches the conception of capability. Practiced skillfully, the monitoring process provides the missing dynamization of the system. Practical tests are needed to explore the workability of this dual-level conception and to specify in further detail the conditions of its successful functioning.

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