

Ambidexterity as a dynamic capability: Resolving the innovator's dilemma

Charles A. O'Reilly III^{a,*}, Michael L. Tushman^b

^aGraduate School of Business, Stanford University, Stanford, CA 94305, USA

^bHarvard Business School, Soldiers Field Road, Boston, MA 02163, USA

Abstract

How do organizations survive in the face of change? Underlying this question is a rich debate about whether organizations can adapt—and if so how. One perspective, organizational ecology, presents evidence suggesting that most organizations are largely inert and ultimately fail. A second perspective argues that some firms do learn and adapt to shifting environmental contexts. Recently, this latter view has coalesced around two themes. The first, based on research in strategy suggests that dynamic capabilities, the ability of a firm to reconfigure assets and existing capabilities, explains long-term competitive advantage. The second, based on organizational design, argues that ambidexterity, the ability of a firm to simultaneously explore and exploit, enables a firm to adapt over time. In this paper, we review and integrate these comparatively new research streams and identify a set of propositions that suggest how ambidexterity acts as a dynamic capability. We suggest that efficiency and innovation need not be strategic tradeoffs and highlight the substantive role of senior teams in building dynamic capabilities.

© 2008 Elsevier Ltd. All rights reserved.

Contents

1. Dynamic capabilities, organizational ambidexterity and competitive advantage	189
1.1. Sensing	190
1.2. Seizing	191
1.3. Reconfiguring	191
2. Exploration, exploitation, and organizational ambidexterity: dynamic capabilities in practice	192
2.1. What Is ambidexterity?	193
2.2. The determinants and consequences of ambidexterity	194
3. Ambidexterity in action	196
4. Future directions	200
5. Conclusion	201
References	202

* Corresponding author. Tel.: +1 650 725 2110.

E-mail addresses: oreilly_charles@gsb.stanford.edu (C.A. O'Reilly III), mtushman@hbs.edu (M.L. Tushman).

“It is not the strongest of the species that survive, nor the most intelligent, but the one that is most responsive to change.”

Charles Darwin

How do organizations survive in the face of change? This fundamental question has engaged scholars from disciplines as disparate as management, history, strategy, organizational sociology, psychology, and economics (e.g., Chandler, 1990; Christensen, 1997; Hannan & Freeman, 1984; Nelson & Winter, 1982; Staw, Sandelands, & Dutton, 1981; Tushman & Romanelli, 1985). It has resulted in organizational theories as diverse as competitive advantage (Porter, 1980), strategic conflict (Shapiro, 1989), organizational ecology (Hannan & Carroll, 1992), punctuated evolution (Tushman & Romanelli, 1985), institutional theory (Meyer & Rowan, 1977), threat-rigidity (Staw et al., 1981), the resource based view of the firm (Barney, 1991), and, more recently, dynamic capabilities (e.g., Eisenhardt & Martin, 2000; Teece, Pisano, & Shuen, 1997).

Underlying this research is a rich debate about a fundamental question: Can organizations adapt and change—and if so, how does this occur? There are two major camps in the research on organizational change: those that argue for adaptation (e.g., punctuated equilibrium, dynamic capabilities); and those that argue that firms are inert and change occurs through an evolutionary process of variation–selection–retention. This latter perspective suggests that as environments shift, inertial incumbent organizations are replaced by new forms that better fit the changed context (Barnett & Carroll, 1995).¹

Interestingly, there is data to support both arguments. For example, in a study of the largest U.S. manufacturing firms in the 20th century, Louca and Mendonca (2002) report that only 28 of the initial 266 companies remained on the list over the period 1917–1997. In their sampling across three major time periods, the authors report that 49% of the firms appear only once, and then disappear, suggesting that most firms do not adapt and are replaced. A McKinsey study of the life expectancy of firms in the S&P 500 showed that in 1935, the average expectancy was 90 years. By 1975, that number had dropped to 30 years, and in 2005 it was estimated to be only 15 years (Foster & Kaplan, 2001). Being large and successful at one point in time is no guarantee of continued survival. Another McKinsey study (Devan, Millan, & Shirke, 2005) examined 266 firms during the period 1984–2004 and found only a small number were financially successful over that period.

Similarly, Wiggins and Ruefli (2002) studied 6772 firms across 40 industries over 25 years and found only a small minority exhibited superior economic performance. Anecdotally, the press routinely reports the failure of formerly prominent firms such as Polaroid, DEC, PanAm, RCA, Sears, and Bethlehem Steel (e.g., Sobel, 1999; Sull, 1999a). Data like these appear to support the ecological position that organizations are largely inert and unable to change (e.g., Amburgey, Kelly, & Barnett, 1993; Audia, Locke, & Smith, 2000; Hannan & Carroll, 1992). In the face of this evidence, Dew et al. (2006, p. 79) conclude that “. . . the strategic manager’s job is in fact futile in the face of environmental disruptions.”

Yet, in spite of these high failure rates, some firms do survive and prosper over long periods of time. DeGeus (1997) reported that there are a sizeable number of firms that are more than 200 years old. Tripsas (1997) recounts the history of Mergenthaler Linotype, a firm founded in 1886 that has survived three technological revolutions. Fig. 1 contains a list of similarly long-lived firms (average age 105 years) that have adapted to change; each began in an industry or technology different from the one they compete in today. For every well-known failure (e.g., Polaroid and PanAm), there are firms like GKN, a 245-year-old maker of auto parts and aero-space materials, that began as a coal mining company, or the Harris Corporation, a 100-year-old high tech electronics firm that began manufacturing printing presses. B.F. Goodrich, for example, was founded in 1870 as a manufacturer of fire hoses and conveyor belts for manufacturing. Today, they are an aerospace company. The Tandy Corporation, founded in 1898, was originally a maker of leather goods and is today a retailer of electronic products. Bally began making pinball machines and now is a large operator of gambling casinos and fitness centers. Famously, IBM began as a maker of mechanical office equipment and today is primarily a service and consulting company. A number of today’s largest automobile

¹ Both economists and sociologists have questioned whether firm survival is optimal (e.g., Dew, Goldfarb, & Sarasvathy, 2006; Hannan & Freeman, 1984). They argue that absent complementary assets, firms should focus on extracting any remaining value from the firm and exit. There is some evidence that firm failure may generate positive externalities and reduce industry costs (Knott & Posen, 2005). While in some cases, this may be arguably the right outcome, our premise is that it is senior management’s job to keep organizations alive and thriving through strategic insight and strategic execution (Harrell et al., 2007)—not to assist in their death. This position underlies most research in strategy and management.

<u>Company</u>	<u>Founded</u>	<u>Original Product</u>	<u>Current Business</u>
Goodrich	1870	Fire Hose	Aerospace
Nokia	1865	Lumber	Mobile Phones
Harris	1895	Printing Press	Electronics
3M	1902	Mining	Office Supplies
Allied Signal	1920	Chemicals	Aerospace
American Express	1850	Express Delivery	Financial Services
Armstrong	1860	Cork	Floor Coverings
Bally	1931	Pinball Machines	Casinos / Fitness
J&J	1885	Bandages	Pharmaceuticals
Black & Decker	1910	Bottle Cap Mach.	Power Tools
Carlson	1938	Gold Bond Stamp	Travel
W.R. Grace	1854	Bat Guano	Chemicals
Hasbro	1923	Carpet Remnants	Toys
Ingram	1857	Sawmills	Distribution
Sunbeam	1890	Horse Clippers	Appliances
ITT	1920	Phone Companies	Insurance
Xerox	1906	Photog. Paper	Business Equip.
Vivendi	1853	Garbage	Media
Tandy	1899	Leather	Retail Electronics
Marriott	1927	Root Beer	Hotels
Southland	1927	Ice	Retail Stores
Morton Intl	1848	Salt	Air Bags
Nucor	1897	Automobiles	Mini-mill Steel

Fig. 1. Long-lived firms that have changed industries (average age 105 years).

manufacturers began as bicycle and carriage makers (Carroll, Bigelow, Seidel, & Tsai, 1996). Is the success of these firms rooted in anything more than luck? Are there systematic patterns that discriminate those companies able to change and survive versus those that fail?

As Carroll and Barnett (1995) perceptively note, there is ample evidence to support both the contention that, as ecological research demonstrates, organizations do become increasingly inert as they age (e.g., Sorensen & Stuart, 2000) even as some adapt and change (e.g., Amburgey et al., 1993; Mitchell & Singh, 1993). Thus, what was seen in the 1990s as a debate between two opposite sides (adaptation versus selection) has evolved into an attempt to understand, both theoretically and empirically, under what conditions some organizations sustain their competitive advantage in the face of environmental transitions while others do not. In this process, more static theories of strategy based on positional or resource advantages (Barnett, Greve, & Park, 1994; Porter, 1980; Rumelt, 1984) have been supplanted with dynamic approaches exploring how some firms recombine and integrate their resources to adapt to market and technological changes. This approach, referred to as *dynamic capabilities*, emphasizes the key role of strategic leadership in appropriately adapting, integrating and reconfiguring organizational skills and resources to match changing environments (Eisenhardt & Martin, 2000; Helfat, 1997; Lavie, 2006; Teece, 2006; Teece et al., 1997).

The ability of senior managers to seize opportunities through the orchestration and integration of both new and existing assets to overcome inertia and path dependencies is at the core of dynamic capabilities. These capabilities, sometimes characterized as high-level routines or processes (Winter, 2003; Zott, 2003), or routines to learn new routines (Eisenhardt & Martin, 2000), are now seen as a central underpinning of long-run

competitive advantage. This perspective highlights the role of senior teams in shaping competitive advantage over time.

Teece et al. (1997, p. 516) define dynamic capabilities as “the firm’s ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments.” Organizational capabilities are embedded in existing organizational routines, structures, and processes. More specifically, these routines are found in the way the organization operates, its structures, cultures, and the mindset of senior leadership. Existing capabilities reflect the firm’s ability to compete in the current environment. The challenge for senior leaders is to both nurture and refine these and to be prepared to reconfigure these assets as contexts shift.

The emerging research on dynamic capabilities, and how these provide firms with long-term competitive advantage, offers a promising way to explain organizational adaptation. Although in its early stages, studies have already illustrated how capabilities may be developed (Bingham, 2005; Ethiraj, Kale, Krishnan, & Singh, 2005; Helfat & Peteraf, 2003; Subramanian & Youndt, 2005; Zollo & Winter, 2002) and provide some preliminary evidence for their long-term consequences on performance and survival (Adner & Helfat, 2003; Gulati, Dialdin, & Wang, 2002; Helfat & Raubitschek, 2000; Klepper, 2002; Macpherson, Jones, & Zhang, 2004). For example, Tripsas and Gavetti (2000), in an in-depth case study of Polaroid, showed how senior management cognitions about how Polaroid competed hindered the firm’s ability to develop the new capabilities needed for the company to compete selling software rather than hardware (cameras). Interestingly, they showed that Polaroid had developed an array of new digital imaging competencies, but that rigidity in existing processes and management’s inability to implement a new business model stopped them from successfully entering new markets. In contrast, Rosenbloom (2000) offers a detailed account of how the NCR Corporation was able to adjust to the introduction of electronics into the field of business equipment and identifies senior management’s ability to develop dynamic capabilities as a key ingredient in their successful transformation.

Similarly, Verona and Ravasi (2003) examined innovation at Oticon, a Danish hearing-aid company, and found that the ability of the firm to continually innovate was a function of knowledge creation (the ability to sense new technological opportunities) and knowledge integration (the ability to seize and implement these advances through organizational processes and structures). The authors illustrate how the development of new capabilities relies on the orchestration of organizational structure, culture, people and process to simultaneously sustain existing product innovation and to spur creativity beyond existing competencies to avoid the problem of core rigidities (Leonard-Barton, 1992). In a simulation study, Zott (2003) suggested that even small differences in dynamic capabilities among firms could account for differential firm performance, a finding consistent with Adner and Helfat (2003).

Much of the research exploring how dynamic capabilities might enable firms to adapt to changes in markets and technologies is preliminary and conceptual. What is missing is a clear articulation of those specific capabilities that facilitate exploration and exploitation (March, 1991). What are those repeatable routines and competencies that are associated with effective short run competition in mature markets and technologies and in the long-term through adaptation to new markets/technologies? This paper attempts to specify those competencies and routines and to show how the ability of senior leaders to reconfigure assets to compete in emerging and mature businesses, to be ambidextrous (O’Reilly & Tushman, 2004; Tushman & O’Reilly, 1996), is a critical element in sustainable competitive advantage. Because the routines, processes, and skills required for exploitation are fundamentally different than those required for exploration, we label these paradoxical capabilities as ambidexterity.² We argue that this senior team capability may be a key discriminator between those firms that thrive as environments shift versus those that do not (Lubatkin, Simsek, Ling, & Veiga, 2006; O’Reilly & Tushman, 2004; Rivkin & Siggelkhow, 2003).

In this review, we first embed the notion of ambidexterity in the dynamic capabilities framework and show how the ability to simultaneously pursue emerging and mature strategies is a key element of long-term success. We then review the existing literature on exploration, exploitation, and ambidexterity to illustrate how this research supports this theoretical framework. We illustrate these notions with several examples of businesses that have been successful at being ambidextrous. We conclude with a set of boundary issues and research questions on ambidexterity, senior teams, and dynamic capabilities.

² While much of the literature discusses ambidexterity as a structural characteristic (e.g., He & Wong, 2004), we use the term to encompass a set of senior team decisions including structure, linking mechanisms, culture, and senior team processes.

1. Dynamic capabilities, organizational ambidexterity and competitive advantage

As some firms, albeit not the majority, do survive in the face of change, the question is how they manage to adapt—and why are some firms able to accomplish this while others cannot? Central to the adaptive process are the notions of a firm's ability to exploit existing assets and positions in a profit producing way and simultaneously to explore new technologies and markets; to configure and reconfigure organizational resources to capture existing as well as new opportunities (Helfat & Raubitschek, 2000; Holmqvist, 2004; March, 1991; Teece, 2006). This capacity has been referred to either as exploration and exploitation (March, 1991) or ambidexterity (Duncan, 1976; Tushman & O'Reilly, 1997). Exploitation is about efficiency, increasing productivity, control, certainty, and variance reduction. Exploration is about search, discovery, autonomy, innovation and embracing variation. Ambidexterity is about doing both. In March's terms, this is the fundamental tension at the heart of an enterprise's long-run survival. "The basic problem confronting an organization is to engage in sufficient exploitation to ensure its current viability and, at the same time, devote enough energy to exploration to ensure its future viability (1991, p. 105)."

The trade-offs necessary to balance this tension are difficult and most often tilted toward exploitation where positive local feedback in the form of customer demand and profits produce path dependence (Benner & Tushman, 2003; Gupta, Smith, & Shalley, 2006; Henderson & Clark, 1990; Levinthal & March, 1993). March (2003, p. 14) argued that because of this short-term bias "established organizations will always specialize in exploitation, in becoming more efficient in using what they already know. Such organizations will become dominant in the short-run, but will gradually become obsolescent and fail." In contrast, returns to exploration are more uncertain, more distant in time, and sometimes a threat to existing organizational units. For these reasons, organizations are often less effective at exploration and become vulnerable to technological and market changes (e.g., Siggelkow, 2001).

From a strategic perspective, achieving long-term success requires that firms possess not only the operational capabilities and competencies to compete in existing markets, but also the ability to recombine and reconfigure assets and organizational structures to adapt to emerging markets and technologies. In this sense, Teece (2006) characterizes dynamic capabilities as the distinct skills, processes, procedures, organizational structures, decision rules and disciplines that enable the senior leaders of a firm to identify threats and opportunities and to reconfigure assets to meet these. "Winners in the global market place have been firms that can demonstrate timely responsiveness and rapid flexible product innovation, coupled with the management capability to effectively coordinate and deploy internal and external competencies (Teece et al., 1997, p. 515)."

Although there is some ambiguity in the terminology of capabilities and competencies, what Winter (2000) has referred to as "terminology haze", there is consensus among strategy scholars that dynamic capabilities are reflected in the organization's ability, manifest in the decisions of senior management, to maintain ecological fitness and, when necessary, to reconfigure existing assets and develop the new skills needed to address emerging threats and opportunities (Eisenhardt & Martin, 2000; Helfat & Peteraf, 2003; Teece et al., 1997; Winter, 2003). In this sense, dynamic capabilities include specific activities such as new product development, alliances, joint ventures, cross line of business innovation, and other more general actions that foster coordination and organizational learning (e.g., Gulati et al., 2002). These capabilities result from actions of senior managers to ensure learning, integration, and, when required, reconfiguration and transformation—all aimed at sensing and seizing new opportunities as markets and technologies evolve.

In contrast to dynamic capabilities, core competencies or operational capabilities are discrete business-level processes and associated activity systems fundamental to running the business which give it a contemporaneous advantage (Leonard-Barton, 1992; Siggelkow, 2001; Siggelkow & Levinthal, 2005). For instance, Southwest Airline's competitive advantage comes not from their resources (planes, routes, or employees) but from the combination of factors such as fast turnaround of their aircraft, high productivity from their employees, and low costs. These difficult-to-imitate competencies (e.g., the routines that keep costs low and asset utilization high) give them an advantage over their competitors. These competencies, while valuable in that they provide competitive advantage, are not dynamic capabilities since they do not ensure that the firm would be able to change in the face of a new threat. Indeed, their previous success has made them slower than competitors like JetBlue Airways to take advantage of new advances in technology that allow fast turnaround with assigned seating. In contrast, the repeatable processes, structures and routines that IBM senior leaders employ to compete in mature technology markets (e.g., mainframe computers) and in emerging markets (e.g., technology consulting or autonomic computing) are dynamic capabilities (Harrell, O'Reilly, & Tushman, 2007).

In organizational terms, dynamic capabilities are at the heart of the ability of a business to be ambidextrous – to compete simultaneously in both mature and emerging markets – to explore and exploit. As Tushman and O'Reilly (1997) have pointed out, this inevitably requires senior leaders to manage completely different and inconsistent organizational alignments. The key success factors needed to succeed at exploitation demand a short-term time perspective, efficiency, discipline, incremental improvement and continuous innovation. The alignment of competencies, systems, structure and culture to execute this strategy is completely different from the alignment needed for exploration, where the key success factors emphasize a longer time perspective, more autonomy, flexibility and risk taking and less formal systems and control.

The organizational alignments associated with exploitation and exploration are both different and inconsistent. Yet both are needed if the firm is to succeed in the short-term and adapt over time. Without this ability to hold inconsistent alignments, organizations succumb to either a “competency trap” in which success leads to repetition and exploitation drives out exploration (e.g., Leonard-Barton, 1992), or a “failure trap” in which inexperience leads to failure and a constant shifting in alternatives in which exploration drives out exploitation (March, 2003; Siggelkow & Rivkin, 2006).

What are the capabilities required for firms to be successful at ambidexterity? Consistent with Teece's tripartite taxonomy of sensing, seizing, and reconfiguring (Teece, 2006), ambidexterity requires a coherent alignment of competencies, structures and cultures to engage in exploration, a contrasting congruent alignment focused on exploitation, and a senior leadership team with the cognitive and behavioral flexibility to establish and nurture both.

1.1. Sensing

Sensing opportunities and threats, particularly in rapidly shifting markets, requires scanning, searching, and exploration. In organizational terms this involves a set of resources and routines such as a strategy-making process associated with variation, resources devoted to competitive intelligence and tracking technological change, and forums for discussions of new opportunities. More subtly and beyond the requisite resources, this capability also requires a balance in centralization and decentralization of control to encourage feedback from market-facing units, a culture of openness that encourages debate, the commitment of resources by senior leaders (financial and time) to encourage long-term thinking, and a senior management team that fosters a long-term mindset and promotes exploration (e.g., Burgelman, 2002; Edmondson, 1999; Rotemberg & Saloner, 2000). For example, Nonaka (1993) described a process characterized by top-down articulation of strategic intent coupled with bottom-up generation of variation in service of learning and innovation. Similarly, Von Hippel's (1988) work on lead users and user communities and Christensen's (1997) work on new markets provide insight into incumbents' opportunities (and difficulties) in sensing exploratory opportunities.

This sensing is difficult for incumbent senior teams. For example, Jackson and Dutton (1988) showed that managers are more sensitive to threats than opportunities. This results, as Tripsas and Gavetti (2000) showed, in a senior team over-weighting current threats and failing to adjust their mindset and entertain new business models. Gilbert's (2005) research in the newspaper industry found similar effects. Teece underscored this view noting that “The skills that result in the identification and/or development of an opportunity are not the same as those required to profit from or exploit the opportunity (1996, p. 23).” These predictable surprises are rooted in senior team cognitions and processes that systematically discount future threats (Bazerman & Watkins, 2004). For example, Harrell et al. (2007, p. 27) in describing the strategic transformation of IBM quote the then CEO, Lou Gerstner, as observing that under the old IBM “All of [our] capabilities were of a business model that had fallen wildly out of step with marketplace realities.”

These sensing activities must occur even though technology trends are hard to discern, particularly as path dependencies and senior team cognitions often lock firms into existing market and technological trajectories (March, Garud, Nayyar, & Shapira, 1997; Staw et al., 1981). For example, in a study of the development of the ink-jet printer Fleming (2002) described how H-P deliberately generated many high variance innovative trials and rapid prototyping to explore new approaches. Bingham (2005) found that the successful development of new capabilities in entrepreneurial firms involved learning from early errors rather than avoiding them. Thus, to promote ambidexterity requires a senior management team that facilitates learning, challenges the status quo, accepts failure, and provides for the integration and transfer of knowledge, even as the exploitive subunit emphasizes the opposite.

1.2. Seizing

Seizing opportunities is about making the right decisions and executing, what others have referred to as strategic insight and strategic execution (Harreld et al., 2007). In organizational terms, this requires leaders who can craft a vision and strategy, ensure the proper organizational alignments (whether it is for exploitation or exploration), assemble complementary assets, and decide on resource allocation and timing. In more concrete terms, this involves developing a consensus among the senior team about the strategic intent, avoiding the decision traps that path dependencies and mindsets bring, and aligning the business model and strategy. Without these capabilities, firms may sense opportunities and threats, but be unable to act on them in a timely manner.

For example, in a study of the automobile industry, Nobeoka and Cusumano (1998) found that a key to long-term success was the ability of some manufacturers to rapidly diffuse technology across various platforms. In another study of new product development, Danneels (2002) suggested that competence at exploratory learning, or learning to learn, was a critical capability to mitigate path dependence, a finding consistent with other research (Helfat & Raubitschek, 2000; McGrath, 2001; Sidhu, Volberda, & Commandeur, 2004). In contrast, Sull (1999b) described how Firestone, the leading U.S. tire company of its era, was unable to adjust to the emergence of radial tire technology—even though they possessed that capability.

1.3. Reconfiguring

While operational capabilities may provide for competitive advantage at a given point in time, long-term success inevitably requires that leaders reallocate resources away from mature and declining businesses toward emerging growth opportunities. “The key to sustained profitable growth is the ability to recombine and reconfigure assets and organizational structures as markets and technologies change (Teece, 2006, p. 38).” This “asset orchestration” is how organizations evolve to maintain ecological fitness. If change is incremental, this realignment may proceed slowly, perhaps through the temporal sequencing of realignments in which structures, processes, people and culture are shifted gradually or in sequence (e.g., Duncan, 1976; Eisenhardt & Brown, 1998; Nickerson & Zenger, 2002; Rindova & Kotha, 2001; Zollo & Winter, 2002). However, in the face of rapid change these strategic realignments are more likely to occur in parallel (e.g., Govindarajan & Trimble, 2005; Markides & Charitou, 2004; Masini, Zollo, & van Wassenhove, 2004; Tushman & Anderson, 1986).

What are the capabilities that facilitate asset orchestration? Again, this involves senior leaders' willingness to commit resources to long-term projects (Danneels, 2002), the ability to design organizational systems, incentives and structures that permit targeted integration across organizational units to capture the advantages of co-specialized assets (Helfat & Peteraf, 2003), and the appropriate staffing of these units (Jansen, 2006; Litz & Klimecki, 2005; Lubatkin et al., 2006). The crucial task here is not the simple organizational structural decision in which the exploratory and exploitative subunits are separated, but the processes by which these units are integrated in a value-enhancing way. Insofar as a reconfiguration represents a break from the organization's past, these shifts may also be associated with an identity shift for the firm's stakeholders (e.g., Alpert & Whetten, 1985; Benner, 2007). If so, the senior team may also need to legitimize these shifts (e.g., Podolny, Khurana, & Popper, 2005; Ravasi & Schultz, 2006).

There is evidence that some firms have been able to achieve this balancing feat. Adler, Goldoftas, and Levine (1999), in a study of New United Motors Inc. (NUMMI), showed that the plant excelled at both efficiency and flexibility. They attribute the former to rigorous continuous improvement and the latter to what they refer to as “meta-routines” or routines used to change other routines. Van Looy, Martens, and Debackere (2005) noted that the complexity of ambidextrous organizations involves costs that could lead to inferior financial returns when compared to a more focused strategy. However, in a simulation study, they concluded that properly designed and managed, ambidextrous forms were sustainable and superior in value creation. O'Reilly and Tushman (2004) described how two organizations, a medical product manufacturer and a newspaper, were able to both explore and exploit through careful orchestration of assets and competencies by the senior leaders and their teams.

Since organizations store such knowledge in procedures, norms, rules, structures and processes, these are skills that typically cannot be bought, or transferred. This suggests that dynamic capabilities are difficult to imitate. However, reaping the benefits of ambidexterity requires a managerial balancing act in which leaders continually design and realign their businesses with the market. Michael Porter, among others, has recognized that “Strategic fit among activities is fundamental not only to competitive advantage but also to sustainability of competitive advantage (1996,

p. 73).” Obtaining fit, alignment, or complementarity is a difficult challenge, especially with organizations of any size or complexity (Milgrom & Roberts, 1995). And, ironically, when businesses do succeed at achieving this fit, the very sources of their success create inertia from the strategies, structures, people, and cultures that have created the success—what Tushman and O’Reilly (1996) have referred to as the “success syndrome” and Audia, Locke and Smith call “the paradox of success” (Audia et al., 2000).

Dynamic capabilities, those processes that permit an enterprise to build, integrate, and reconfigure organizational assets, offer one way out of the inertial dynamics associated with success. Unfortunately, the management challenges of ambidexterity, in which organizations simultaneously explore and exploit and compete with different business models, are substantial. We review the existing literature on exploration, exploitation and ambidexterity to illustrate how the origins and consequences of dynamic capabilities affect an organization’s ability to adapt. We then provide several examples of dynamic capabilities and ambidexterity in action.

2. Exploration, exploitation, and organizational ambidexterity: dynamic capabilities in practice

Based largely on March’s (1991) seminal paper on exploration and exploitation, there has been a growing interest in research on if, when, and how organizations adapt to change. For example, Christensen (1997) described how disruptive technologies undermine an established firm’s competitive position by offering a cheaper and often less sophisticated alternative that is good enough for most customers. In spite of the deadly consequences of disruptive technology for successful incumbents, Christensen is pessimistic about the ability of existing organizations to both explore and exploit and concludes that “Creating a separate organization is...necessary when the disruptive technology has a lower profit margin than the mainstream business and must serve a new set of customers (Christensen & Bower, 1996).” In his view, firms cannot both explore and exploit but must spin-out the exploratory business to succeed.

That organizations cannot simultaneously pursue exploration and exploitation is supported by research in strategy where attempts to pursue different strategies result in firms being “stuck in the middle” or mediocre at both exploration and exploitation (Ghemawat & Costa, 1993; Porter, 1980). For example, in a study of the strategies of 300 small companies, Ebben and Johnson (2005) found that firms attempting to pursue both efficiency and flexibility performed less well than those with a single, focused strategy. Others have suggested that rather than attempt to adapt over long periods, it may be more efficient for companies to pursue a single strategy until they fail (e.g., Anand & Singh, 1997; Dew et al., 2006; Knott & Posen, 2005).

While provocative, this sentiment sits uncomfortably with the mandate for leaders of organizations to ensure that their firms are profitable in the short-term and able to adapt to changes and remain successful in the long-term. Shareholders prefer growth to decline (Mass, 2005). CEOs are typically not employed to preside over the decline of a firm but to develop strategies that ensure continued success (Chandler, 1990). “The fundamental question of the field of strategic management is how firms achieve and *sustain* [emphasis added] competitive advantage (Teece et al., 1997, p. 1).” As suggested by the dynamic capabilities framework, this involves reconfiguring assets to capture new opportunities.

How does this conclusion square with the substantial evidence of organizational failure seen in studies of organizational ecology? In their review of the organizational change literature, Barnett and Carroll (1995) observed that for studies of organizational change to be complete, they need to address two dimensions: the content of the change (what changes), and the process (how these changes occur). In their view, most studies examined only one of these dimensions. For example, sociological research tends to focus on what actually happened to organizations over time but says little about internal organizational processes associated with a particular outcome. What is missing, they argue, is a “lack of theoretically motivated content variables (1995, p. 228)” specifying the differential effects of the content and process of change in organizations. Dynamic capabilities offer a theoretically compelling way to understand this change process. From this perspective, the focus is on those mechanisms that facilitate the enterprise’s ability to explore and exploit over time; specifically on how the firm and its leaders are organized to sense and seize opportunities and their ability to reconfigure assets to address these.

Fortunately, there is evidence that some firms can do this. In a study of 100 large organizational failures, Probst and Raisch (2005) found that in all the cases they studied, failure was home-grown and not inevitable. A new and growing body of research on organizational ambidexterity is specifically focused on this question. Our literature review revealed more than 40 studies in this domain, most conducted within the last few years. These studies are

methodologically diverse and include in-depth case studies, simulations, formal modeling, lab studies and field studies. Several explicitly acknowledge the linkage between dynamic capabilities and organizational adaptation (e.g., Harrell et al., 2007; He & Wong, 2004; Tushman, Smith, Wood, Westerman & O'Reilly, 2007; Venkatraman, Lee, & Iyer, 2006) while others focus more on outcomes such as new product development or organizational performance associated with ambidexterity (e.g., Gibson & Birkenshaw, 2004; Markides & Charitou, 2004).

Other related studies, while not addressing ambidexterity directly, investigate how organizations pursue exploration and/or exploitation, especially as it affects the firm's ability to innovate (e.g., Holmqvist, 2004; Lee, Lee, & Lee, 2003; Nemancich & Keller, 2006; Sidhu et al., 2004). Taken as a whole, these and related research on organizational learning, absorptive capacity, and organizational inertia (Gilbert, 2005; Jansen, Van den Bosch, & Volberda, 2005b; Katila & Ahuja, 2002; Levinthal & March, 1993; McGrath, 2001; Siggelkow & Levinthal, 2003; Siggelkow & Rivkin, 2005) provide a window into the linkage between dynamic capabilities and ambidexterity.

2.1. *What Is ambidexterity?*

In the first use of the term “organizational ambidexterity,” Duncan (1976), building on earlier studies (e.g., Burns & Stalker, 1961; Thompson, 1967), argued that for long-term success firms needed to consider dual structures; different structures to initiate versus execute innovation. In his view, ambidexterity occurs sequentially as organizations switch structures as innovations evolve. Firms adjust their structures by the phase of the innovation process: organic structures are employed to explore followed by mechanistic structures to exploit. This view of ambidexterity as temporal sequencing is evident in some of the current research on organizational adaptation (e.g., Eisenhardt & Brown, 1998; Lovas & Ghoshal, 2000; Venkatraman et al., 2006).

While the temporal sequencing of exploration and exploitation is feasible in many circumstances, this approach is predicated on the assumption that the rate of change in markets and technologies proceeds at a pace that permits firms to choose organizational alignments sequentially. An alternative conceptualization, propounded initially by Tushman and O'Reilly (1997), argued that given the complexity and pace of change faced by many organizations and the time needed to develop new products and services, ambidexterity may require that exploitation and exploration be pursued simultaneously, with separate subunits, business models, and distinct alignments for each. Ambidexterity, in this conceptualization, entails not only separate structural subunits for exploration and exploitation but also different competencies, systems, incentives, processes and cultures—each internally aligned. These separate units are held together by a common strategic intent, an overarching set of values, and targeted structural linking mechanisms to leverage shared assets. These internally inconsistent alignments and the associated strategic tradeoffs are orchestrated by a senior team with a common fate incentive system and team processes capable of managing these inconsistent alignments in a consistent fashion (e.g., O'Reilly & Tushman, 2004; Smith & Tushman, 2005).

When ambidexterity is adopted sequentially, the challenges facing senior management are quite different than when pursued simultaneously (e.g., Gupta et al., 2006). In the former, the challenge is transforming one internally consistent strategy and organizational alignment (e.g., a focus on efficiency or exploitation) to another. While difficult, this is not as complex as simultaneously managing two inconsistent alignments. To explore and exploit at the same time requires that senior management articulate a vision and strategic intent that justifies the ambidextrous form (e.g., Rotemberg & Saloner, 2000). Why should different subunits collaborate? Is there a future state that justifies their cooperation and provides rewards for both? For example, in a study of 139 small businesses, Lubatkin and his colleagues found that the behavioral integration of the top management team, its unity of purpose and ability to synchronize actions, was a significant determinant of successful ambidexterity and subsequent performance (Lubatkin et al., 2006).

Second, the operation of two separate organizational alignments with different competencies, incentives, and cultures increases the chances for conflict, disagreement, and poor coordination. To ameliorate this requires a common set of values and shared meanings that provide a common identity, even though these values may foster different operating norms across the businesses (Podolny et al., 2005; Tushman & O'Reilly, 1997; Voss, Cable, & Voss, 2006). Jansen (2006), for example, in a study of 211 banks demonstrated that the provision of a shared vision was positively related to the successful pursuit of ambidexterity.

Third, is there a clear consensus within the senior team about the strategy and the importance of ambidexterity? Can the senior team manage the conflicts and interface issues that such a design entails? Without this consensus, disagreements within the senior team undermine the coordination needed to balance exploration and exploitation (Lubatkin et al., 2006; Smith & Tushman, 2005). In a study of exploration and exploitation, Sidhu et al. (2004) found

that a clear vision was an important determinant of success. Specifically, is there a common incentive system for the senior team that is anchored on the overall firm success, not the accomplishments of a separate unit?

Finally, to capture the benefits of exploration and exploitation, does the organizational architecture provide the targeted integration necessary to leverage both exploitation and exploration and to capture the benefits of both (Govindarajan & Trimble, 2005; Lubatkin et al., 2006; Westerman, Iansiti, & McFarlan, 2006). In illustrating how ambidexterity was operationalized at *USA Today*, O'Reilly and Tushman (2004) described the critical importance of daily editorial meetings and senior-level oversight as targeted linking devices to leverage common news content between *USA Today's* newspaper and dot-com platforms. At IBM, the SVP of strategy meets monthly with leaders of exploratory businesses, both to monitor progress and to ensure coordination across businesses (Harreld et al., 2007). In a study of drug stores, Westerman et al. (2006) found that different linking mechanisms were employed as product class conditions shifted to on-line prescriptions. In contrast, without these tactical linking mechanisms, exploratory units may be unable to leverage the exploitative unit's capabilities (e.g., Siggelkow & Rivkin, 2006).

Overall, there is broad recognition that the challenges of managing a mature business, with its emphasis on productivity, incremental improvement, and short-term focus, is quite different from managing an entrepreneurial venture with the mandate to move quickly, learn from failure, and a more long-term orientation. Managing an ambidextrous form brings with it a further set of challenges for senior managers to communicate clearly their vision and values and deal with the tensions that the pursuit of different business models requires. Smith and Tushman (2005) call attention to the stresses that the paradoxical frames of exploration and exploitation create—and the cognitive complexity required by senior teams to manage these contradictions.

2.2. *The determinants and consequences of ambidexterity*

Given this difficulty, why should managers even attempt this feat? Two figures help illustrate contexts where ambidexterity may be strategically important. The first is the notion of innovation streams (Fig. 2) and illustrates how technology and markets evolve over time (Tushman & O'Reilly, 1997; Tushman & Smith, 2002). The first axis is based on customers and markets. Firms can offer products and services to existing customer segments or to new ones. The second axis is based on the nature of the innovation. Taken together, innovation streams help illustrate why firms often overemphasize exploitation at the expense of exploration—and why firms that do engage in exploration often fail to capture the benefits of their innovation (Teece, 1998).

Innovation occurs in roughly three distinct ways. First is incremental innovation in which an existing product or service is made better, faster or cheaper (Nelson & Winter, 1982). Although these improvements may be difficult or expensive, they draw on an existing set of competencies and proceed along a known trajectory. Conventional pharmaceutical development, for example, while expensive and technologically complex, usually is based on existing scientific paradigms. A second way innovation occurs is through major or discontinuous changes in which major improvements are made, typically through a competence-destroying advance in technology (e.g., Tushman & Anderson, 1986). For instance, the development of computer-based word processing obviated the need for mechanical typewriters; the electronic watch eliminated the need for the precision mechanical engineering skills of mechanical

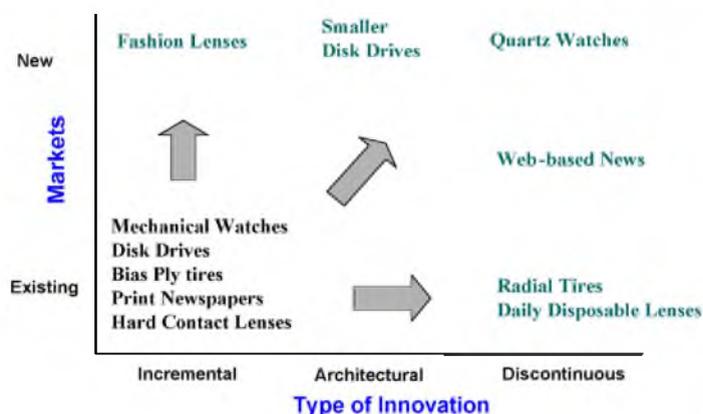


Fig. 2. Innovation streams.

watches. These improvements typically require competencies or skills different from what the incumbent has. Finally, innovation also occurs through seemingly minor improvements in which existing technologies or components are integrated to dramatically enhance the performance of existing products or services (Henderson & Clark, 1990). These architectural innovations, while not based on significant technological advances, often disrupt existing offerings. In Christensen's study of the disk drive industry (1997), smaller disk drives used existing technologies made smaller to open up new classes of storage devices.

In Fig. 2, exploitation occurs when firms rely on existing competencies or operational capabilities to sell to existing customers. Over time, successful firms become knowledgeable of their customers and efficient at meeting their needs. Their strategy and organizational alignments among competencies, formal structures, and cultures evolve to reflect this. However, in the face of competition and decreasing margins in these markets, firms often seek to move into adjacent markets by either addressing new customer segments or through innovations that enable them to charge customers a higher price or reap higher margins.

These shifts in strategy may require a different set of competencies and a different organizational alignment—and established firms may be unable to make these shifts. Incumbents either do not see the need to move from the origin or do so either late or incompetently (e.g., Christensen, 1997; Smith & Tushman, 2005; Sull, Tedlow, & Rosenbloom, 1997; Tripsas & Gavetti, 2000; Tushman et al., 2007). These failures of incumbents are predictable surprises (Bazerman & Watkins, 2004). Tushman and O'Reilly (1997) identify a firm's inability to host exploitation and exploration as a key ingredient in these failures. Ironically, it is almost always the case that the failed firm had the new technology, but was unable to capture value from it (Chesbrough & Rosenbloom, 2002; Sull, 1999b; Teece, 1998).

Given the difficulty of simultaneously hosting exploration and exploitation, why would an organization bother; under what conditions might ambidexterity be especially important? One approach to this question is illustrated in Fig. 3. On occasion, firms either develop or are presented with opportunities to move into areas beyond their core. In studying corporate entrepreneurship, Burgelman (1984) categorized opportunities according to whether they were strategically important and/or whether the opportunities could leverage existing firm assets or not (e.g., sales channels, manufacturing, common technology platform). As suggested in Fig. 3, when new opportunities are unimportant strategically and cannot benefit from a firm's existing resources or capabilities, there is no rationale to pursue them and the recommendation is to spin them out, either within the larger company or to the public. O'Reilly and Tushman (2004) describe how *Ciba Vision*, a maker of contact lenses, developed a drug that combated a debilitating eye disease. However, since this product was sold through different channels (to ophthalmologists rather than optometrists), had different regulatory approvals, involved different technologies (chemistry rather than applied materials) and required a different manufacturing process, the company spun the product out to their parent corporation where it became a successful pharmaceutical compound.

If a product has low strategic importance but offers operational leverage (e.g., the use of channels of distribution) it can be either internalized or contracted out. For example, the repair of most personal computers, a low margin item, is handled by contractors rather than the manufacturer. When a business is strategically important but cannot benefit

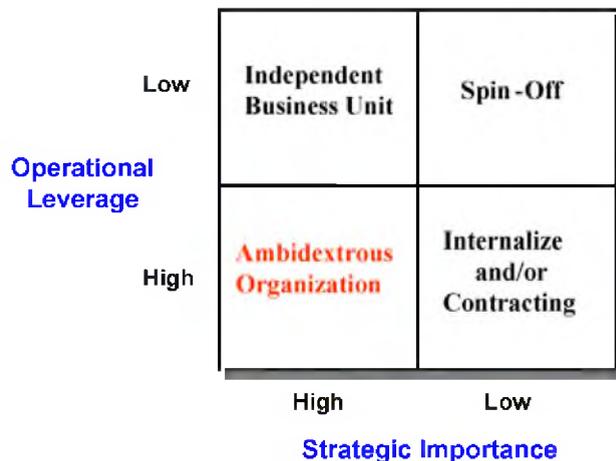


Fig. 3. When should ambidexterity be considered?

from leveraging existing firm assets, the advice is to operate the new business as an independent business unit. This is often the case with product substitutions, when one technology or process is replaced by another. For instance, in the 1970s Mettler-Toledo, a Swiss company, was the leader in mechanical balances used for scientific measurement. With the advent of electronic scales it became clear that the mechanical technology would be replaced. To manage this transition, the company manufactured both types until, as customer demand grew for electronic instruments, they were able to eliminate mechanical scales. The two businesses were based on different competencies and manufacturing processes and were managed as independent units. Integration occurred only through the sales force that sold both products.

But what happens if the new opportunity is both strategically important and can benefit from the firm's existing assets and operational capabilities? This is the set of strategic conditions where ambidextrous designs are most appropriate. In these circumstances, to spin the exploratory unit out is to sacrifice the future or, at minimum, endure the inefficiencies of not using available resources. Burgelman (1991) builds a persuasive case that, when managed effectively, large organizations have the luxury of internalizing the variation–selection–retention process of markets to create an internal selection environment that permits experimentation and exploration. Unlike the harsh discipline of the market in which new firms must place a life-or-death bet on a single experiment, larger companies can run multiple experiments in which failure does not jeopardize the enterprise and may increase learning.

There is empirical evidence to support these arguments. Both He and Wong (2004) and Venkatraman et al. (2006) found that ambidexterity was associated with higher sales growth. In a study of 22 innovation attempts across 13 companies, Tushman and his colleagues explored the consequences of different organizational designs on innovation outcomes (Tushman et al., 2007). Their results showed that ambidextrous designs were more effective than functional, cross-functional or spin-out designs, and that switching to an ambidextrous design was associated with increased innovation. Further, the performance of existing products was higher in ambidextrous organizations. The only instance when simpler designs were more successful was for product substitutions in which an existing product or technology is supplanted by a new one.

Other studies have suggested that the combination of exploration and exploitation is associated with longer survival (Cottrell & Nault, 2004), better financial performance (Govindarajan & Trimble, 2005; Markides & Charitou, 2004), and improved learning and innovation (Adler et al., 1999; Holmqvist, 2004; Katila & Ahuja, 2002; McGrath, 2001; Rothaermel & Deeds, 2004). Thus, although ambidexterity is a difficult managerial challenge, when executed in the appropriate strategic contexts, these complex designs are associated with sustained competitive advantage.

Given the promise of ambidexterity, a number of studies have attempted to understand its antecedents. Several have demonstrated that it is more likely to occur under conditions of environmental dynamism. Using ambidexterity as the dependent variable, Jansen, Van den Bosch, and Volberda (2005a) found that it was more likely when the firm's markets were unstable, changing, and competitive. Other studies have found similar effects; the more dynamic the firm's environment, the higher the likelihood of ambidexterity (e.g., Lee et al., 2003; Masini et al., 2004; McGrath, 2001; Raisch, 2006; Siggelkow & Levinthal, 2003; Siggelkow & Rivkin, 2005). Other determinants of ambidexterity include the diversity of experience in the senior team (Beckman, 2006) and performance shortfalls and pressure on senior management (Holmqvist, 2004; Tushman et al., 2007). These empirical findings reflect the same conditions under which dynamic capabilities are most valuable (Eisenhardt & Martin, 2000; Teece, 2006) and reinforce the importance of ambidexterity as a dynamic capability.

3. Ambidexterity in action

Conceptually, dynamic capabilities are a useful way to understand inter-firm performance differentials (Ethiraj et al., 2005), but what specifically would these capabilities look like and how would they operate to help a firm sense, seize, and reconfigure organizational assets? Eisenhardt and Martin (2000) note that unless made specific, dynamic capabilities remain vague (e.g., “routines to learn routines”) and add little other than terminology to our understanding of organizational adaptation. What is needed is the identification of specific senior team behaviors and organizational processes/routines that allow firms to manipulate resources into new value creating strategies. Ambidexterity as a dynamic capability is not itself a source of competitive advantage but facilitates new resource configurations that can offer a competitive advantage (Eisenhardt & Martin, 2000; Winter, 2000).

With regard to ambidexterity, a dynamic capability can be seen as a set of actions (or routines) taken by senior management that permit the enterprise to identify opportunities and threats and reconfigure assets (people,

organizational architectures, and resources) to adapt to these. Based on the extant research, we offer a set of propositions outlining a set of senior team processes and actions that enable firms to integrate and recombine resources to permit simultaneous exploitation (competing in mature markets and technologies, typically through competence-enhancing change) and exploration (competing in new technologies or markets, often with competence-destroying change). These senior team actions, behaviors, and design choices comprise the dynamic capabilities that enable firms to simultaneously explore and exploit. As will be illustrated below, a failure on the part of the senior team to engage in these actions reduces the likelihood that their organizations will succeed in being ambidextrous.

Proposition 1. *The presence of a compelling strategic intent that justifies the importance of both exploitation and exploration increases the likelihood of ambidexterity.*

Ambidexterity is both a difficult managerial challenge and potentially inefficient (Van Looy et al., 2005). It asks managers to deliberately and consciously engage in experimentation and small-scale efforts with a long-term possible payout rather than the short-term maximization of profit. Exploration, and the uncertainty it entails, diverts resources and attention away from exploitation (March, 1991). Therefore, in the absence of an explicit strategy that justifies this experimentation, the default option is to focus on short-term profitability, usually by eliminating variance and costs. Unless there is a clear, intellectually compelling rationale for the importance of both exploration and exploitation, the short-term pressures will almost always move attention and resources away from the higher variance, less certain world of exploration.

O'Reilly and Tushman (2004), for example, describe the pressures facing Tom Curley, publisher of the *USA Today* newspaper, in the late 1990s. Then, as today, there are clear trends documenting the decline of daily circulation and advertising revenues for print media and the concomitant increase for web-based news sites. With falling readership and revenues, Curley decided that *USA Today* needed to be a “network” rather than solely a newspaper; a network able to leverage its news content across Gannett’s paper, web-site, and television platforms. This required Curley to justify to all employees what the future state of the organization would be and how they would service all three platforms. Absent this strategic clarity, employees would (and some still did) resist the change.

At the corporate level, to both sense and seize new opportunities, IBM has articulated a strategy of Emerging Business Organizations (EBOs) that explicitly justifies to the entire organization why the company needs to fund small, often money-losing new ventures that cut across lines of business (Harreld et al., 2007). IBM established a rigorous process to increase experimentation in new technologies and markets, to stop these ventures when they fail to meet milestones, or to integrate them back into mature units when they succeed. Contrast this with Burgelman’s (2002) detailed account of how Intel’s huge success in microprocessors led then CEO Andy Grove to denigrate a successful non-core systems business as a “distraction.” Ironically, as the microprocessor business flattened, this distraction became an important source of new revenues for the company. In the absence of a clear strategic intent justifying the emerging business, success is defined by financial metrics that work against new units and resources for exploration may be stunted.

Proposition 2. *The articulation of a common vision and values that provide for a common identity increase the likelihood of ambidexterity.*

Separate from the intellectual rationale provided by a strategic intent is the issue of emotional identity of the employees and the ability of leaders to infuse their firm with value and meaning (Larwood, Falbe, Kriger, & Miesing, 1995; Podolny et al., 2005; Sidhu et al., 2004; Voss et al., 2006). An overarching vision and values permits employees from the legacy and new business to forge a common identity, even as they pursue different business strategies. A vision helps employees adopt the long-term mindset that is important for exploration (Ravasi & Schultz, 2006). Again, absent an over-arching vision to bind groups together, the question is why should units collaborate with each other rather than compete?

For example, O'Reilly and Tushman (2004) describe how in the 1990s the President of Ciba Vision, a comparatively small maker of contact lenses, decided to both explore and exploit—by competing in the mature business of conventional contact lenses and to explore new technologies and markets for extended wear and fashion lenses. These latter businesses required new technology and manufacturing competencies, were physically separate businesses units, but required collaboration from the older units, and, if successful, would threaten the core business. In order to provide a common identity, the President propounded a vision of the company as providing “healthy eyes for life,” a vision that justified both the old and the new businesses.

Similarly, Tom Curley's vision at *USA Today* emphasized the idea of the enterprise as a network and not a newspaper, with both the old print and new on-line businesses as fundamental for long-term success. The paper's core values of fairness, accuracy, trust, and timeliness applied across platforms, although the cultures of the different units varied. At Johnson and Johnson, the large health care company, the J&J Credo articulates a set of principles that provide the core values for businesses as diverse as pharmaceuticals, baby shampoo, and Tylenol. Without a common vision and values, the separate businesses have no common identity and be less likely to collaborate.

Proposition 3. *A clear consensus among the senior team about the unit's strategy, relentless communication of this strategy, and a common-fate incentive system increases the likelihood of ambidexterity.*

A third characteristic needed for ambidexterity is a senior team that is in agreement about the importance of both exploitation and exploration—with neither being seen as more important. Research has documented that unity of purpose is a critical element of successful ambidexterity (Jansen, 2006; Lubatkin et al., 2006; Sidhu et al., 2004). Without a clear consensus in the senior team about the strategy and vision, there will be less information exchange, more unproductive conflict, and a diminished ability to respond to external change (Hambrick, 1994). Mixed signals from the senior team make the already delicate balancing act between exploration and exploitation more difficult.

There are several ingredients for this recipe. First, diversity in experience within the team has been shown to promote ambidexterity (Beckman, 2006) while a lack of diversity reduces it (Sull et al., 1997). However, for diversity to be effective, senior leadership needs to both legitimate the ambidextrous form and to act as a protector of exploratory efforts (Charitou & Markides, 2004; O'Reilly & Tushman, 2004; Smith & Tushman, 2005; Tushman et al., 2007). Second, there is evidence that the senior team requires a common incentive system to promote unity. Lou Gerstner, former CEO of IBM, described how in order to develop a unified outlook, the senior team was rewarded on company-wide metrics, not line-of-business results or financial metrics (Harreld et al., 2007). When members of the senior team are rewarded for line-of-business performance rather than the business as a whole, there is often an increased focus on the short-term and independent results rather than long-term collaboration. Ray Stata, who was CEO of Analog Devices from its founding in 1965 until 2003, led the firm through several technological transformations and emphasizes that while the incentives within the exploratory and exploitative subunits need to be aligned (typically milestones and sales growth for the former and margins and profit for the latter), the senior team needs to be rewarded on company-wide performance (Govindarajan & Trimble, 2005).

Third, in the presence of continued dissent the senior leader needs to be prepared to eliminate those who oppose the ambidextrous form. For example, to ensure consensus for his network strategy at *USA Today*, Tom Curley replaced five of his seven senior managers. At Ciba Vision, 60% of the senior team was replaced. Lou Gerstner, who replaced almost his entire senior team upon his arrival at IBM, is on record noting the potential importance of “public hangings” to ensure focus. The relentless communication of the strategic intent and vision are essential for the success of ambidexterity.

Proposition 4. *Separate aligned organizational architectures (business models, competencies, incentives, metrics, and cultures) for explore and exploit subunits and targeted integration increase the likelihood of successful ambidexterity.*

The *raison d'être* for the ambidextrous form as opposed to a spin-out is to allow an organization to experiment and to leverage organizational assets and capabilities that would not be available if the business were operating independently. But this is a delicate balance. To succeed, exploratory units need to get the resources they require even as they avoid being overwhelmed by the mature business. This requires senior-level integration for strategic issues and tactical integration to leverage company assets (Tushman et al., 2007). For example, at *USA Today*, Tom Curley and his senior team met frequently to make resource allocation decisions (e.g., investment in web technology rather than new printing presses) while tactical integration occurred in daily joint editorial meetings in which decisions were made in allocating the day's news across platforms. Both the web and the print business used a common sales force. At IBM, strategic integration for EBOs occurs to decide on issues such as which new technologies and markets to pursue and the evaluation of EBO performance. Tactical integration occurs with each EBO using mature business assets and resources as needed. For instance, the initiative to develop a life sciences business required that assets be provided by the software and consulting units. Sales, however, was done by the EBO itself.

While simple conceptually, it is frequently the case that in the pursuit of exploration, senior managers fail to provide the requisite integration, or worse, burden the new business with systems and thinking from the old business. This can leave exploratory units without sufficient resources or at the risk of being overwhelmed by the mature business. For instance, units may be asked to comply with the demands of the legacy business (e.g., financial reporting, IT systems, or HR processes) that burden them. Corporate staff typically attempt to minimize transaction costs, a reasonable endeavor for mature businesses. However, this emphasis is counter to the needs of an exploratory business.

To mitigate the effects of the legacy business on EBOs, IBM is explicit in categorizing businesses by their time frame (Horizons 1, 2, and 3 businesses). Exploratory subunits, or EBOs, are referred to as “Horizon 3” businesses. These units have a senior-level sponsor, hire people with the necessary skills, design appropriate metrics and rewards, develop unique local cultures, and are led by people with skills quite different from those required in running mature businesses. IBM’s senior team recognizes that the management challenges are different across time horizons and explicitly trains leaders for emerging businesses differently from their mature units (Harrell et al., 2007). In contrast, Durisin and Todorova (2004) attribute the failure of an exploratory effort they studied to the inability of the leader to develop a new culture aligned with the new strategy.

Proposition 5. *Senior leadership that tolerates the contradictions of multiple alignments and is able to resolve the tensions that ensue increases the likelihood of ambidexterity.*

Ambidextrous organizations create inevitable conflicts between operating units. The short-term, efficiency and control of a mature unit is at odds with the uncertainty and inefficiency of experimentation. How these tensions are resolved is a crucial element in the ability of an organization to simultaneously explore and exploit. If the exploratory unit is not seen as strategic by senior management, it runs the risk of succumbing to short-term cost pressures or a lack of management attention. Larger and more profitable businesses are likely to lay claim to needed resources. To succeed requires what Burgelman (2002) refers to as “strategic debate”—the ability of senior leaders to encourage dissent and permit would-be champions to argue their points.

At Ciba Vision, the President deliberately included the heads of exploratory units in his senior management meetings and encouraged them to argue their positions with mature business unit leaders. At Analog Devices, Ray Stata described the style needed as an ability to “absorb contradictions” and actually built a sound-proof room where managers could scream at each other. At IBM, the senior leader of EBOs encourages disciplined, fact-based conversations in which EBO leaders are able to challenge others, including senior managers. In describing how organizations can compete with dual business models (explore and exploit), Markides and Charitou (2004) underscore the importance of conflict resolution skills, “The question is not whether conflict exists. . . the key question is how well the company manages these conflicts.” Unless the senior team has the capacity to foster these discussions and a willingness to take action, the conflicts endemic in ambidexterity are likely to undermine its benefits.

The importance of ambidextrous leadership, and its fragility, is suggested by Gilbert’s (2005) distinction between resource and routine rigidity. Resource rigidity is defined as a failure to change resource patterns. Routine rigidity is a failure to change the organizational processes needed to use these resources. The research reviewed here on organizational adaptation reveals an interesting paradox consistent with Gilbert’s distinctions. In many of the well-know organizational failures, the incumbents had the requisite technology; that is, they had invested in the resources needed to adapt (e.g., Nobeoka & Cusumano, 1998; Sobel, 1999; Sull, 1999a; Tripsas & Gavetti, 2000). Resource rigidity did not appear to be the problem. Rather, there was significant routine rigidity; senior managers failed to capture the value from these resources—a failure of routine rigidity. Consistent with this, Gilbert (2005) concludes that in the face of external threats, organizations typically overcome resource rigidity but increase the routine rigidity.

These five propositions, based on the existing empirical evidence, summarize the conditions under which organizational ambidexterity is likely to be successful. These propositions are also the foundational elements for ambidexterity as a dynamic capability. Absent a clear strategic intent, an over-arching vision and values, an aligned senior team, an appropriate organizational architecture with targeted integration, and the ability of the senior team to manage the inevitable trade-offs and conflict, it is difficult to manage ambidexterity. It is the complementary set of senior team actions that permit exploration to take root in the context of exploitative inertial forces.

The competencies required by leaders to manage the ambidextrous form are different, and more subtle, than those needed to run either an exploratory or an exploitative business. In the latter, the fundamental issues are around achieving organizational alignment with the strategy—either around costs, efficiency, and scale or experimentation, risk and speed. In the ambidextrous form, managers must be consistently inconsistent, encouraging both exploitation

and exploration. This capability, to both explore and exploit, helps organizations to reconfigure existing assets and capabilities to sense and seize new opportunities. Without it, path dependence dynamics or structural inertia drive organizations toward continued successful exploitation – and, in the face of changing markets and technology – toward failure.

4. Future directions

The fundamental logic underlying evolutionary adaptation is variation–selection–retention. Organizational ecologists have used this to explain mortality rates among populations of organizations (Hannan & Carroll, 1992) and to argue against organizational adaptation. Yet this same variation–selection–retention logic underlies the idea of exploration–exploitation and organizational ambidexterity. As a dynamic capability, ambidexterity helps organizations sense and seize new opportunities and to mitigate the effects of path dependence. In this regard, ambidexterity does not mean random variation or tolerating inefficiency but a deliberate approach to variation–selection–retention that uses existing firm assets and capabilities and reconfigures them to address new opportunities. When done explicitly, this involves deliberate investments and promotes organizational learning that results in a repeatable process (e.g., Ethiraj et al., 2005; Harrell et al., 2007). This is a dynamic capability that has been characterized as the firm's ability “to learn how to learn” and can be used to promote exploration and exploitation (Danneels, 2002). However, unless ambidexterity is consciously managed, senior leaders can easily make invalid inferences from their organizational learning (Denrell, 2003; Levinthal & March, 1993).

There is growing evidence to support the view that ambidexterity promotes organizational growth and adaptation (e.g., Govindarajan & Trimble, 2005; He & Wong, 2004; Markides & Charitou, 2004; Tushman et al., 2007; Venkatraman et al., 2006). There is, however, some confusion in the use of the term. In our view, ambidexterity is a specific capability embodied in senior leadership's learning and expressed through their ability to reconfigure existing organizational assets and competencies in a repeatable way to adapt to changing circumstances.

We do not believe that ambidexterity is rooted in an individual's ability to explore and exploit as suggested by Gibson and Birkenshaw (2004); nor is ambidexterity simply a matter of organizational structure (Gupta et al., 2006; O'Reilly & Tushman, 2004). Although it is theoretically possible to conceive of ambidexterity in these ways, they do not meet the standards of a dynamic capability that can help an enterprise adapt. Nor is ambidexterity as a dynamic capability equivalent to ad hoc problem solving in which a business may “solve” a problem on a one time basis by setting up a successful exploratory venture (Winter, 2000). Rather, as a dynamic capability ambidexterity embodies a complex set of routines including decentralization, differentiation, targeted integration, and the ability of senior leadership to orchestrate the complex trade-offs that ambidexterity requires. These are founded in part on tacit knowledge and require long-term commitments to specialized resources.

Ambidexterity as a dynamic capability is also not equivalent to new product development (e.g., Dew et al., 2006; Ebben & Johnson, 2005). While new product development may be one manifestation of innovation, it does not necessarily imply organizational adaptation. Many organizations have sophisticated new product development processes that are exploitative; that is, in terms of the innovation streams portrayed in Fig. 2, the innovation is incremental (e.g., Danneels, 2002). Studies that equate ambidexterity with new product development often fail to make this distinction and can result in contradictory findings (Gupta et al., 2006; Holmqvist, 2004; Knott, 2003; Lee et al., 2003). Simply being successful at developing new products in a declining market or technology does not guarantee survival (Mitchell & Singh, 1993; Siggelkow & Rivkin, 2006). Further, studies that focus on new product development as an indicator of exploration often ignore the underlying enabling structures and routines that are central to an understanding of dynamic capabilities (see Masini et al. (2004) for an exception). The five propositions offered above suggest a complementary set of structures, routines, and leadership actions that may provide the basis for further empirical studies.

Three important but still unresolved issues concern when ambidexterity is most valuable: (the simultaneous/sequential question), the appropriate level of strategic integration (at what level in the firm are strategic trade-offs made), and how deliberate or conscious ambidexterity needs to be. In the first instance, there is disagreement among researchers on whether exploration and exploitation should occur serially, with separate periods of exploitation and exploration (e.g., Brown & Eisenhardt, 1997; Ebben & Johnson, 2005; Gibson & Birkenshaw, 2004; Nickerson & Zenger, 2002; Siggelkow & Levinthal, 2003), or whether the two processes should occur simultaneously (e.g., Adler et al., 1999; Govindarajan & Trimble, 2005; Knott, 2003; Markides & Charitou, 2004; Tushman & O'Reilly, 1996). As

March (2003) observes, there is no free lunch in achieving this balance. Too much emphasis on exploration risks pursuing bad ideas; too much exploitation can lead to fatal missed opportunities (e.g., Christensen, 1997). The balance may depend critically on the speed and type of change confronting organizations (Raisch, 2006). In slow moving environments, the need for exploration is reduced while in hyper-competitive situations it is heightened. With slower rates of change, ambidexterity may be more sequential than simultaneous while in rapidly shifting environments ambidexterity may need to be done in parallel. As Winter (2000) observes, when the opportunities for competitively significant change are sparse, the costs of developing dynamic capabilities may not be matched by corresponding benefits. In regimes of slow change, constant experimentation may be inefficient and the costs of ambidexterity high. Unfortunately, the empirical evidence for these speculations is, however, contradictory and more theoretical clarity about the specific nature and periodicity of the change is needed before this question can be resolved.

A related ambiguity concerns the level of analysis for ambidexterity. Research has conceptualized exploration and exploitation at the organization, business unit, project, and individual levels of analysis. The best empirical evidence suggests that ambidexterity occurs at the corporate and business unit level of the organization. Harrell et al. (2007) illustrate how IBM has developed the capability to continually explore and exploit at the corporate and business unit levels. A number of studies link ambidexterity to organizational performance, implicitly assuming that it occurs at the organizational level (e.g., He & Wong, 2004; Venkatraman et al., 2006). Other studies describe ambidexterity at the business unit level (Adler et al., 1999; Knott, 2003; O'Reilly & Tushman, 2004; Tushman et al., 2007). When studies conceive of ambidexterity at the project or individual level, the evidence is more mixed (e.g., Gibson & Birkenshaw, 2004; Puranam, Singh, & Zollo, 2006). From a theoretical viewpoint (variation–selection–retention), adaptation seems most likely to occur at the business unit level. It is here that variation and selection can be operationalized in a convincing way. Although it is conceivable that adaptation could occur at lower or higher levels in an organization (e.g., at the project level), the business unit appears to be where it will be most salient for organizational adaptation.

A final ambiguity concerns whether ambidexterity is a deliberate process capable of being repeated or is an ad hoc process (Winter, 2000). Arguably, some organizations have managed to adapt through unconscious actions or luck. For instance, over a 50-year period, Hewlett-Packard moved from being an instrument company to a mini-computer firm to a maker of printers. These transitions resulted not from a conscious design on the part of senior managers but from a culture that valued decentralization, innovation, divisional autonomy, and a practice of spinning off new units when divisions became larger than 1200 people. Recent changes toward stricter financial controls and a new, more centralized culture have eliminated this capability. Similarly, the history of B.F. Goodrich shows that a critical element in their transition from a tire manufacturer to an aero-space firm was the absence of a supply of natural rubber during WWII, and their entry into the chemicals business. This was driven by exogenous events and not an explicit process. In these and other cases adaptation is not by explicit design.

In contrast, to be useful, a dynamic capability must be repeatable; that is, the underlying processes are explicitly learned and managed by senior leaders. These skills can be developed and are difficult for competitors to imitate (Teece, 2006). However, these capabilities can be lost if senior management is not explicit in protecting them. Theoretically, this requires a clear specification of the characteristics of senior teams that are associated with the ability to attend to and deal with the strategic contradictions associated with exploration and exploitation (e.g., Smith & Tushman, 2005). For example, research linking the ambidextrous form to firm performance illustrates the benefits of exploration and exploitation but does not necessarily signify the presence of a dynamic capability (e.g., He & Wong, 2004). It is only if management is consciously able to orchestrate firm assets and resources in a repeatable way that ambidexterity becomes a dynamic capability. Thus, an important future research direction is to further understand the characteristics and process of senior teams that are able to attend to and deal with the contradictions and paradox associated with exploration and exploitation (e.g. Bazerman & Watkins, 2004; Smith & Tushman, 2005).

5. Conclusion

In his influential book, *The Innovator's Dilemma*, Christensen (1997) described the challenges facing organizations attempting to adapt to changes in technologies, markets, competition and regulatory environments. He builds a compelling case for the need for differential organizational alignments to pursue exploitation and exploration. Yet, in the end, he concludes that it is not possible to resolve the “innovator's dilemma” and argues that, confronted with a disruptive change, managers cannot simultaneously explore and exploit. They must spin out the exploratory sub-unit. We believe that this approach is useful, but only in the limited set of strategic contexts suggested in Fig. 3. Christensen,

in his second book, *The Innovator's Solution* (Christensen & Raynor, 2003), acknowledges that a spin-out may be an inadequate response and suggests that new ways are needed to resolve the innovator's dilemma. We think ambidexterity is one solution to the innovator's dilemma.

Comparatively, there are more examples of firm failure than long-term success. However, we argue here that under the appropriate conditions organizations may be able to both explore into new spaces as well as exploit their existing capabilities. Although not easily done, we believe that these strategic contradictions can be resolved by senior leaders who design and manage their own processes and, in turn, ambidextrous organizations. We induced a set of senior team actions, processes, and design choices that comprise a set of dynamic capabilities. These capabilities enable firms to reconfigure existing assets and learn new capabilities to both explore and exploit.

To accomplish this difficult feat is primarily a leadership task rather than one of structure and design. It requires a leadership team with the skills necessary to provide a compelling vision and strategic intent, a clear consensus and commitment within the team, the skills to manage differentiated sub-units with aligned sub-unit organizational architectures (explore and exploit) with clearly defined interfaces to leverage existing assets, and the ability to resolve the inevitable conflicts that this design entails. Although ambiguities remain about whether ambidexterity is achieved sequentially or in parallel, at the business unit or organizational level, or how exactly these skills are acquired, the preponderance of theory and research suggests that ambidexterity can be a critical mechanism for organizational adaptation.

The idea of ambidexterity challenges the widely held assumption that innovation and efficiency are orthogonal and trade-offs must always sacrifice one for the other. Just as the old assumptions about the trade-offs between cost and quality were overturned by the quality movement, ambidexterity suggests that under certain well-specified circumstances, it may be possible for organizations to pursue both exploitation and exploration. Accepting that variation–selection–retention is a powerful logic for adaptation does not mean that it be mindless. Ambidexterity is one way in which managers may encourage variation in an efficient manner. In Burgelman's (2002) terms, it substitutes an external selection environment in which wrong choices lead to firm failure with an internal one that permits failure without the destruction of the larger organization. As Carroll and Barnett (1995) observed, what has been missing is the lack of theoretically motivated content to understand the process through which organizations change. We believe that ambidexterity is one way to gain this insight.

References

- Adler, P., Goldoftas, B., & Levine, D. (1999). Flexibility versus efficiency? A case study of model changeovers in the Toyota production system. *Organization Science*, *10*, 43–68.
- Adner, R., & Helfat, C. E. (2003). Corporate effects and dynamic managerial capabilities. *Strategic Management Journal*, *24*, 1011–1025.
- Alpert, S., & Whetten, D. A. (1985). Organizational identity. In Cummings, L., & Staw, B. Eds. *Research in organizational behavior*. Vol. 7 (pp.263–296). JAI Press.
- Amburgey, T. L., Kelly, D., & Barnett, W. P. (1993). Resetting the clock: The dynamics of organizational change and failure. *Administrative Science Quarterly*, *38*, 51–73.
- Anand, J., & Singh, H. (1997). Asset redeployment, acquisitions, and corporate strategy in declining industries. *Strategic Management Journal*, *18*, 99–118.
- Audia, P. G., Locke, E. A., & Smith, K. G. (2000). The paradox of success: An archival and a laboratory study of strategic persistence following radical environmental change. *Academy of Management Journal*, *43*, 837–853.
- Barnett, W. P., & Carroll, G. R. (1995). Modeling internal organizational change. *Annual Review of Sociology*, *21*, 217–236.
- Barnett, W. P., Greve, H. R., & Park, D. Y. (1994). An evolutionary model of organizational performance. *Strategic Management Journal*, *15*, 11–28.
- Barney, J. (1991). Firm resources and competitive advantage. *Journal of Management*, *17*, 99–120.
- Bazerman, M., & Watkins, M. (2004). *Predictable surprises*. Boston: Harvard Business School Press.
- Beckman, C. M. (2006). The influence of founding team company affiliations on firm behavior. *Academy of Management Journal*, *49*, 741–758.
- Benner, M. (2007). Incumbent discount: Stock market categories and response to radical technological change. *Academy of Management Review*, *32*, 703–720.
- Benner, M. J., & Tushman, M. L. (2003). Exploitation, exploration and process management: The productivity dilemma revisited. *Academy of Management Review*, *28*, 238–256.
- Bingham, C. B. (2005). *Learning from heterogeneous experience: The internationalization of entrepreneurial firms*. In Stanford School of Engineering Working Paper.
- Brown, S. L., & Eisenhardt, K. M. (1997). The art of continuous change: Linking complexity theory and time-based evolution in relentlessly shifting organizations. *Administrative Science Quarterly*, *42*, 1–34.
- Burgelman, R. A. (1984). Designs for corporate entrepreneurship in established firms. *California Management Review*, *28*, 154–166.

- Burgelman, R. A. (1991). Intraorganizational ecology of strategy making and organizational adaptation: Theory and field research. *Organization Science*, 2, 239–262.
- Burgelman, R. A. (2002). *Strategy is destiny: How strategy-making shapes a company's future*. New York: Free Press.
- Burns, T., & Stalker, G. M. (1961). *The management of innovation*. London: Tavistock.
- Carroll, G., & Barnett, W. (1995). Modeling internal organizational change. *Annual Review of Sociology*, 21, 217–236.
- Carroll, G. R., Bigelow, L. S., Seidel, M.-D.L., & Tsai, L. B. (1996). The fates of *de novo* and *de alio* producers in the American automobile industry 1885–1981. *Strategic Management Journal*, 17, 117–137.
- Chandler, A. D. (1990 March–April). The enduring logic of industrial success. *Harvard Business Review*, 130–140.
- Charitou, C., & Markides, C. (2004). Competing with dual business models: A contingency approach. *Academy of Management Review*, 18, 22–36.
- Chesbrough, H., & Rosenbloom, R. S. (2002). The role of the business model in capturing value from innovation: Evidence from Xerox Corporation's technology spin-off companies. *Industrial and Corporate Change*, 11, 529–555.
- Christensen, C. M. (1997). *The innovator's dilemma: When new technologies cause great firms to fail*. Boston, MA: Harvard Business School Press.
- Christensen, C. M., & Bower, J. (1996). Customer power, strategic investment, and the failure of leading firms. *Strategic Management Journal*, 17, 197–218.
- Christensen, C. M., & Raynor, M. (2003). *The innovator's solution: Creating and sustaining successful growth*. Boston, MA: Harvard Business School Press.
- Cottrell, T., & Nault, B. R. (2004). Product variety and firm survival in the microcomputer software industry. *Strategic Management Journal*, 25, 1005–1025.
- Danneels, E. (2002). The dynamics of product innovation and firm competences. *Strategic Management Journal*, 23, 1095–1121.
- DeGeus, A. (1997). *The living company: Habits for survival in a turbulent business environment*. Boston, MA: Harvard Business School Press.
- Denrell, J. (2003). Vicarious learning, undersampling of failure, and the myths of management. *Organization Science*, 14, 227–243.
- Devan, J., Millan, A. K., & Shirke, P. (2005). Balancing short- and long-term performance. *McKinsey Quarterly*, 1, 31–33.
- Dew, N., Goldfarb, B., & Sarasvathy, S. (2006). Optimal inertia: When organizations should fail. *Ecology and Strategy*, 23, 73–99.
- Duncan, R. B. (1976). The ambidextrous organization: Designing dual structures for innovation. In R. H. Kilmann, L. R. Pondy, & D. Slevin (Eds.), *The management of organization design: Strategies and implementation* (pp. 167–188). New York: North Holland.
- Durisin, B., & Todorova, G. (2004). *The ambidextrous organization: Managing simultaneously incremental and radical innovation*. In SDA Bocconi Working Paper No. 96/03.
- Ebben, J. J., & Johnson, A. C. (2005). Efficiency, flexibility, or both? Evidence linking strategy to performance in small firms. *Strategic Management Journal*, 26, 1249–1259.
- Edmondson, A. (1999). Psychological safety and learning behavior in teams. *Administrative Science Quarterly*, 44, 350–383.
- Eisenhardt, K., & Brown, S. (1998 March–April). Time pacing: Competing in markets that won't stand still. *Harvard Business Review*, 60–69.
- Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: What are they? *Strategic Management Journal*, 21, 1105–1121.
- Ethiraj, S., Kale, P., Krishnan, M. S., & Singh, J. (2005). Where do capabilities come from and how do they matter: A study in the software services industry. *Strategic Management Journal*, 26, 25–45.
- Fleming, L. (2002). Finding the organizational sources of technological breakthroughs: The story of Hewlett-Packard's thermal ink-jet. *Industrial and Corporate Change*, 11, 1059–1084.
- Foster, R., & Kaplan, S. (2001). *Creative destruction: Why companies are built to last and underperform the market—and how to successfully transform them*. New York: Currency.
- Ghemawat, P., & Costa, J. E. (1993). The organizational tension between static and dynamic efficiency. *Strategic Management Journal*, 14, 59–73.
- Gibson, C. B., & Birkenshaw, J. (2004). The antecedents, consequences, and mediating role of organizational ambidexterity. *Academy of Management Journal*, 47, 209–226.
- Gilbert, C. (2005). Unbundling the structure of inertia: Resource versus routine rigidity. *Academy of Management Journal*, 48, 741–763.
- Govindarajan, V., & Trimble, C. (2005 May). Building breakthrough businesses within established organizations. *Harvard Business Review*, 1–11.
- Gulati, R., Dialdin, D. A., & Wang, L. (2002). Organizational networks. In J. Baum (Ed.), *Companion to organizations* (pp. 281–303). New York: Blackwell.
- Gupta, A. K., Smith, K. G., & Shalley, C. E. (2006). The interplay between exploration and exploitation. *Academy of Management Journal*, 49, 693–706.
- Hambrick, D. C. (1994). Top management groups: A conceptual integration and reconsideration of the “team” label. In B. Staw & L. Cummings (Eds.), *Research in organizational behavior* (pp. 171–214). Greenwich, CT: JAI Press.
- Hannan, M. T., & Carroll, G. R. (1992). *Dynamics of organizational populations*. New York: Oxford University Press.
- Hannan, M. T., & Freeman, J. H. (1984). Structural inertia and organizational change. *American Sociological Review*, 49, 149–164.
- Harreld, J. B., O'Reilly, C. A., & Tushman, M. L. (2007). *Dynamic capabilities at IBM: Driving strategy into action*. In Stanford GSB Working Paper.
- He, Zi-lin, & Wong, P.-K. (2004). Exploration vs. exploitation: An empirical test of ambidexterity. *Organization Science*, 15, 481–494.
- Helfat, C. E. (1997). Know-how and asset complementarity and dynamic capability accumulation: The case of R&D. *Strategic Management Journal*, 18, 339–360.
- Helfat, C. E., & Peteraf, M. A. (2003). The dynamic resource-based view: Capability lifecycles. *Strategic Management Journal*, 24, 997–1010.
- Helfat, C. E., & Raubitschek, R. S. (2000). Product sequencing: Co-evolution of knowledge, capabilities, and products. *Strategic Management Journal*, 21, 961–979.
- Henderson, R. M., & Clark, K. (1990). Architectural innovation: The reconfiguration of existing product technologies and the failure of established firms. *Administrative Science Quarterly*, 35, 9–30.

- Holmqvist, M. (2004). Experiential learning processes of exploitation and exploration within and between organizations: An empirical study of product development. *Organization Science*, *15*, 70–81.
- Jackson, S. E., & Dutton, J. E. (1988). Discerning threats and opportunities. *Administrative Science Quarterly*, *33*, 370–387.
- Jansen, J. J. (2006, August). *Senior teams and organizational ambidexterity: The moderating role of transformational leadership*. In Paper presented at the Annual Academy of management Meetings. Atlanta, GA, in press.
- Jansen, J. J., Van den Bosch, F. A., & Volberda, H. W. (2005a). Exploratory innovation, exploitative innovation, and ambidexterity: The impact of environmental and organizational antecedents. *Schmalenbach Business Review*, *57*, 351–363.
- Jansen, J., Van den Bosch, F. A., & Volberda, H. (2005b). Managing potential and realized absorptive capacity: How do organizational antecedents matter? *Academy of Management Journal*, *48*, 999–1015.
- Katila, R., & Ahuja, G. (2002). Something old, something new: A longitudinal study of search behavior and new product introduction. *Academy of Management Journal*, *45*, 1183–1194.
- Klepper, S. (2002). The capabilities of new firms and the evolution of the U.S. automobile industry. *Industrial and Corporate Change*, *11*, 645–666.
- Knott, A. M. (2003). Persistent heterogeneity and sustainable innovation. *Strategic Management Journal*, *24*, 687–705.
- Knott, A. M., & Posen, H. (2005). Is failure good? *Strategic Management Journal*, *26*, 617–641.
- Larwood, L., Falbe, C. M., Kriger, M. P., & Miesing, P. (1995). Structure and meaning of organizational vision. *Academy of Management Journal*, *38*, 740–769.
- Lavie, D. (2006). Capability reconfiguration: An analysis of incumbent responses to technological change. *Academy of Management Review*, *31*, 153–174.
- Lee, J., Lee, J., & Lee, H. (2003). Exploration and exploitation in the presence of network externalities. *Management Science*, *49*, 553–570.
- Leonard-Barton, D. (1992). Core capabilities and core rigidities: A paradox in managing new product development. *Strategic Management Journal*, *13*, 111–125.
- Levinthal, D., & March, J. (1993). The myopia of learning. *Strategic Management Journal*, *14*, 95–112.
- Litz, S., & Klimecki, R. (2005). Balanced contracting in the ambidextrous organization. Working Paper, University of Konstanz.
- Louca, F., & Mendonca, S. (2002). Steady change: The 200 largest US manufacturing firms throughout the 20th century. *Industrial and Corporate Change*, *4*, 817–845.
- Lovas, B., & Ghoshal, S. (2000). Strategy as guided evolution. *Strategic Management Journal*, *21*, 875–896.
- Lubatkin, M. H., Simsek, Z., Ling, Y., & Veiga, J. F. (2006). Ambidexterity and performance in small- to medium-sized firms: The pivotal role of TMT behavioral integration. *Journal of Management*, *32*, 1–27.
- Macpherson, A., Jones, O., & Zhang, M. (2004). Evolution or revolution? Dynamic capabilities in a knowledge-dependent firm. *R&D Management*, *34*, 161–177.
- March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization Science*, *2*, 71–87.
- March, J. G. (2003, April). *Understanding organizational adaptation*. In Paper presented at the Budapest University of Economics and Public Administration.
- March, J. G., Garud, R., Nayyar, P., & Shapira, Z. B. (1997). *Technological innovation: Oversights and foresights*. New York: Cambridge University Press.
- Markides, C., & Charitou, C. (2004). Competing with dual business models: A contingency approach. *Academy of Management Executive*, *18*, 22–36.
- Masini, A., Zollo, M., & van Wassenhove, L. (2004, September). *Understanding exploration and exploitation in changing operating routines: The influence of industry and organizational traits*. In London Business School Working Paper, OTM 04-022.
- Mass, N. (2005 April). The relative value of growth. *Harvard Business Review*, 102–112.
- McGrath, R. (2001). Exploratory learning, innovative capacity, and managerial oversight. *Academy of Management Journal*, *44*, 118–131.
- Meyer, J., & Rowan, B. (1977). The effects of education as an institution. *American Journal of Sociology*, *83*, 55–77.
- Milgrom, P., & Roberts, J. (1995). Complementarities and fit: Strategy, structure, and change in manufacturing. *Journal of Accounting and Economics*, *19*, 179–208.
- Mitchell, W., & Singh, K. (1993). Death to the lethargic: Effects of expansion into new technical subfields on performance in a firm's base business. *Organization Science*, *4*, 152–180.
- Nelson, R., & Winter, S. (1982). *An evolutionary theory of economic change*. Cambridge, MA: Harvard University Press.
- Nemancich, L. A., & Keller, R. T. (2006). *Leading through the exploration/exploitation paradox: How top executives define their firm's innovation trajectory*. In Paper presented at the Annual Meetings of the Academy of Management. Atlanta, GA.
- Nickerson, J., & Zenger, T. (2002). Being efficiently fickle: A dynamic theory of organizational choice. *Organization Science*, *13*, 547–566.
- Nobeoka, K., & Cusumano, M. A. (1998). Multiproduct strategy and sales growth: The benefits of rapid design transfer in new product development. *Strategic Management Journal*, *18*, 169–186.
- Nonaka, I. (1993). *The knowledge creating company*. New York: Oxford University Press.
- O'Reilly, C. A., & Tushman, M. L. (2004 April). The ambidextrous organization. *Harvard Business Review*, 74–83.
- Podolny, J., Khurana, R., & Popper, M. (2005). Revisiting the meaning of leadership. *Research in Organizational Behavior*, *26*, 1–36.
- Porter, M. (1980). *Competitive strategy*. New York: Free Press.
- Probst, G., & Raisch, S. (2005). Organizational crisis: The logic of failure. *Academy of Management Executive*, *19*, 90–105.
- Puranam, P., Singh, H., & Zollo, M. (2006). Organizing for innovation: Managing the coordination-autonomy dilemma in technology acquisitions. *Academy of Management Journal*, *49*, 263–280.
- Raisch, S. (2006, August). *Exploration vs. exploitation: A metaparadigm view of ambidextrous organizational forms*. In Paper presented at the Annual Meetings of the Academy of Management. Atlanta, GA.

- Ravasi, D., & Schultz, M. (2006). Responding to organizational identity threats: Exploring the role of organizational culture. *Academy of Management Journal*, 49, 433–458.
- Rindova, V. P., & Kotha, S. (2001). Continuous “morphing”: Competing through dynamic capabilities, form, and function. *Academy of Management Journal*, 44, 1263–1280.
- Rivkin, J. W., & Siggelkrow, N. (2003). Balancing search and stability: Interdependencies among elements of organizational design. *Management Science*, 49, 290–311.
- Rosenbloom, R. S. (2000). Leadership, capabilities, and technological change: The transformation of NCR in the electronic era. *Strategic Management Journal*, 21, 1083–1103.
- Rotemberg, J., & Saloner, G. (2000). Visionaries, managers, and strategic direction. *RAND Journal of Economics*, 31, 693–716.
- Rothaermel, F. T., & Deeds, D. L. (2004). Exploration and exploitation alliances in biotechnology: A system of new product development. *Strategic Management Journal*, 25, 201–221.
- Rumelt, R. (1984). Toward a strategic theory of the firm. In Lamb, B. R. (Ed.), *Competitive strategic management*. Vol. 26 (pp.556–570). Englewood Cliffs, NJ: Prentice-Hall.
- Shapiro, C. (1989). The theory of business strategy. *RAND Journal of Economics*, 20, 125–137.
- Sidhu, J., Volberda, H., & Commandeur, H. (2004). Exploring exploration orientation and its determinants: Some empirical evidence. *Journal of Management Studies*, 41, 913–932.
- Siggelkrow, N. (2001). Change in the presence of fit: The rise, the fall, and the renaissance of Liz Claiborne. *Academy of Management Journal*, 44, 838–857.
- Siggelkrow, N., & Levinthal, D. A. (2003). Temporarily divide to conquer: Centralized, decentralized, and reintegrated organizational approaches to exploration and adaptation. *Organization Science*, 14, 650–669.
- Siggelkrow, N., & Levinthal, D. A. (2005). Escaping real (non-benign) competency traps: Linking the dynamics of organizational structure to the dynamics of search. *Strategic Organization*, 3, 85–115.
- Siggelkrow, N., & Rivkin, J. (2005). Speed and search: Designing organizations for turbulence and complexity. *Organization Science*, 16, 101–122.
- Siggelkrow, N., & Rivkin, J. (2006). When exploration backfires: Unintended consequences of organizational search. *Academy of Management Journal*, 49, 779–796.
- Smith, W., & Tushman, M. L. (2005). Managing strategic contradictions: A top management model for managing innovation streams. *Organization Science*, 16, 522–536.
- Sobel, R. (1999). *When giants stumble: Classic business blunders and how to avoid them*. Paramus, NJ: Prentice Hall.
- Sorensen, J., & Stuart, T. (2000). Aging, obsolescence, and organizational innovation. *Administrative Science Quarterly*, 45, 81–112.
- Staw, B. M., Sandelands, I. E., & Dutton, J. E. (1981). Threat-rigidity effects in organizational behavior: A multilevel analysis. *Administrative Science Quarterly*, 26, 501–524.
- Subramanian, M., & Youndt, M. A. (2005). The influence of intellectual capital on the types of innovative capabilities. *Academy of Management Journal*, 48, 450–463.
- Sull, D. N. (1999, July–August). Why good companies go bad. *Harvard Business Review*, 1–10.
- Sull, D. N. (1999b). The dynamics of standing still: Firestone tire and rubber and the radial revolution. *Business History Review*, 73, 430–464.
- Sull, D. N., Tedlow, R. S., & Rosenbloom, R. (1997). Managerial commitments and technological change in the U.S. tire industry. *Industrial and Corporate Change*, 6, 461–500.
- Teece, D. J. (1998). Capturing value from knowledge assets: The new economy for know-how and intangible assets. *California Management Review*, 40, 55–78.
- Teece, D. J. (2006, December). *Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance*. In Haas School of Business Working Paper.
- Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18, 509–533.
- Thompson, J. D. (1967). *Organizations in action: Social sciences bases of administrative theory*. New York: McGraw-Hill.
- Tripsas, M. (1997). Surviving radical technological change through dynamic capability: Evidence from the typesetter industry. *Industrial and Corporate Change*, 6, 341–377.
- Tripsas, M., & Gavetti, G. (2000). Capabilities, cognition, and inertia: Evidence from digital imaging. *Strategic Management Journal*, 21, 1147–1161.
- Tushman, M. L., & Anderson, P. (1986). Technological discontinuities and organizational environments. *Administrative Science Quarterly*, 31, 439–465.
- Tushman, M. L., & O'Reilly, C. A. (1996). The ambidextrous organization: Managing evolutionary and revolutionary change. *California Management Review*, 38, 1–23.
- Tushman, M. L., & O'Reilly, C. A. (1997). *Winning through innovation: A practical guide to leading organizational change and renewal*. Boston, MA: Harvard University Press.
- Tushman, M. L., & Romanelli, E. (1985). Organizational evolution: A metamorphosis model of convergence and reorientation. *Research in Organizational Behavior*, 7, 171–222.
- Tushman, M. L., & Smith, W. (2002). Organizational technology. In J. Baum (Ed.), *Companion to organizations*. New York: Blackwell.
- Tushman, M. L., Smith, W. K., Wood, R. C., Westerman, G., & O'Reilly, C. A. (2007). *Organizational designs and innovation streams*. In Harvard Business School Working Paper.
- Van Looy, B., Martens, T., & Debackere, K. (2005). Organizing for continuous innovation: On the sustainability of ambidextrous organizations. *Creativity and Innovation Management*, 14, 208–221.
- Venkatraman, N., Lee, C.-H., & Iyer, B. (2006, August). *Strategic ambidexterity and sales growth: A longitudinal test in the software sector*. In Paper presented at the Annual Meetings of the Academy of Management. Honolulu, Hawaii.

- Verona, G., & Ravasi, D. (2003). Unbundling dynamic capabilities: An exploratory study of continuous product innovation. *Industrial and Corporate Change*, *12*, 577–606.
- Von Hippel, E. (1988). *Sources of innovation*. New York: Oxford University Press.
- Voss, Z. G., Cable, D. M., & Voss, G. B. (2006). Organizational identity and firm performance: What happens when leaders disagree about “who we are?”. *Organizational Science*, *17*, 741–755.
- Westerman, G., Iansiti, M., & McFarlan, W. (2006). Organization design and effectiveness over the innovation life cycle. *Organization Science*, *17*, 230–238.
- Wiggins, R. R., & Ruefli, T. W. (2002). Sustained competitive advantage, temporal dynamics and the incidence and persistence of superior economic performance. *Organization Science*, *13*, 81–105.
- Winter, S. G. (2000). The satisficing principle in capability learning. *Strategic Management Journal*, *21*, 981–996.
- Winter, S. G. (2003). Understanding dynamic capabilities. *Strategic Management Journal*, *24*, 991–995.
- Zollo, M., & Winter, S. G. (2002). Deliberate learning and the evolution of dynamic capabilities. *Organization Science*, *13*, 339–351.
- Zott, C. (2003). Dynamic capabilities and the emergence of intra-industry differential firm performance: Insights from a simulation study. *Strategic Management Journal*, *24*, 97–125.