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# How Do Firms Adapt to Discontinuous Change?

## BRIDGING THE DYNAMIC CAPABILITIES AND AMBIDEXTERITY PERSPECTIVES

**Julian Birkinshaw**  
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*This article develops a conceptual integration of the dynamic capabilities and ambidexterity perspectives in order to understand how firms adapt to discontinuous change. Based on three illustrative case studies, it demonstrates that it is not possible to identify a universal set of dynamic capabilities. Rather, the distinct set of capabilities required depends on which of three modes of adaptation (structural separation, behavioral integration, or sequential alternation) has been prioritized. This article contributes a contingency perspective to dynamic capability research and offers guidance to managers about the alternative approaches they could take when seeking to adapt to environmental discontinuities. (Keywords: Case Study, Management Styles, Organizational Design, Innovation, Creative Collaboration, Entrepreneurship, Crowdsourcing, Data Bases, Business-Government Relations)*

**A**n enduring topic of interest in the business literature is how firms adapt to changes in their external environment. It is well understood that established firms frequently fail to adapt effectively. Recent examples of this phenomenon include Blockbuster, Eastman Kodak, HMV, Lehman Brothers, and Nokia. Research has suggested that such failures are particularly prevalent when the nature of external change is *discontinuous* rather than incremental, meaning that it requires firms to reconfigure their existing ways of working and to rethink their assumptions about how to succeed in their chosen industry.<sup>1</sup>

A large number of theoretical perspectives have been used to make sense of this phenomenon and to provide insights for established firms about how they can become more effective in adapting to discontinuous change. Perhaps the most influential perspective is the notion of *dynamic capabilities*, defined as the ability to continuously create, extend, upgrade, protect, and keep relevant an enterprise's unique asset base.<sup>2</sup> Dynamic capabilities, according to Teece, can be broken down into three categories: sensing (the identification and assessment of opportunities and threats), seizing (the mobilization of resources to address opportunities and threats), and reconfiguring (also called transforming; the continuous renewal of a

firm's tangible and intangible assets).<sup>3</sup> For example, Amazon's launch of the Kindle in 2006 involved sensing the impending threat to its core book-selling business, seizing the opportunity through rapid development of a first-generation e-book reader, and then gradually reconfiguring its internal activities to ensure that the Kindle became an integrated part of its overall market offering.

A related theoretical perspective that has become popular in recent years is the notion of *ambidexterity*, defined as the capacity of an organization to address mutually conflicting demands.<sup>4</sup> While the notion of ambidexterity is relevant in a wide variety of settings, it is particularly useful

to the study of discontinuous change, because it provides insight into *how* firms explore new opportunities while continuing to exploit their existing markets and resources. It is a useful complement to the dynamic capabilities perspective because it clarifies the strengths and weaknesses of different organizational arrangements chosen by executives to sense and seize opportunities and to reconfigure their internal activities.

In this article, we bring these two theoretical perspectives together to provide a sharper focus on the most critical challenges that firms face in adapting to discontinuous change. Building on the ambidexterity literature, we propose three distinct modes of adaptation that firms can pursue when faced with discontinuities in their environment.<sup>5</sup> *Structural separation* involves placing exploration and exploitation activities into different organizational units. *Behavioral integration* emphasizes bringing the conflicting activities together in a single unit by designing a supportive behavioral context. *Sequential alternation* involves deliberately vacillating between exploration and exploitation over time.

Because each of these modes of adaptation involves such different organizational arrangements, the specific capabilities firms need to successfully implement them will also differ significantly. To explore this perspective, we compare and contrast three large firms—Nestlé SA (Nestlé), GlaxoSmithKline (GSK), and the BMW Group (BMW)—to understand how their chosen mode of adaptation to discontinuous change worked in practice over a fifteen-year period. As anticipated, we observe that the three firms developed their own distinctive capabilities. Nestlé, which focused on structural separation, developed a *resource-linking capability* for orchestrating the interplay of sensing capabilities in exploration-oriented units and seizing capabilities in exploitation-oriented units. GSK, which emphasized behavioral integration, built a *context-shaping capability* to help operating unit managers sense and seize opportunities at the same time. BMW, which emphasized sequential alternation, developed a *focus-shifting capability* that allowed managers to transition from seizing to sensing and back again over multiple years. All three can be viewed as higher-order “reconfiguring” capabilities in that they were developed primarily by top executives as a way of providing oversight to implement the chosen mode of adaptation in each firm.

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Our study makes contributions to both theory and practice. At a theoretical level, our findings suggest that the firm's chosen mode of adaptation determines not only the levels at which sensing and seizing capabilities are held within organizations, but also the specific type of reconfiguring capability that is needed to adapt to discontinuous change. In other words, and in contrast to the arguments of Teece or Eisenhardt and Martin, we do not find it possible to identify a generic set of dynamic capabilities that apply in all settings.<sup>6</sup> Instead, in our case studies, the specific set of capabilities needed to effectively adapt to discontinuous change and the levels at which they are held appear to vary depending on whether the firm has emphasized structural separation, behavioral integration, or sequential alternation. By analyzing the major changes made by each firm over time, we further show how their chosen mode of adaptation and the associated capabilities were consistent with their own organizational heritage as well as their vision, culture, and people development models. These insights provide important nuances to the prevailing arguments about the nature of dynamic capabilities in the literature.

In terms of practical implications, our study provides relevant insights to managers about the important choices they have to make when facing discontinuities in their environment, namely, which mode of adaptation to pursue and what capabilities to develop in different parts of the organization, and at different points in time, to successfully adapt to these changes.

## Conceptual Background

Many firms struggle to adapt effectively to discontinuous changes in their external environment.<sup>7</sup> A number of theoretical perspectives have been used to make sense of this phenomenon and to provide insights for established firms about how they can become more effective in adapting to discontinuous change. One highly influential approach is the notion of dynamic capabilities, introduced first in 1997 by Teece, Pisano, and Shuen and subsequently developed further by Teece and others.<sup>8</sup> Whereas the “basic” capabilities for managing a firm—in terms of operational procedures, budgeting, planning, and so forth—are sufficient in slow-moving environments, success in a fast-moving environment requires “dynamic” capabilities, which can be further broken down into clusters based on sensing, seizing, and reconfiguring.<sup>9</sup> For example, Harreld, O'Reilly, and Tushman have shown how IBM's transformation through the 1990s and 2000s was achieved through the conscious development of dynamic capabilities based on sensing (strategic insight) and seizing (strategic execution).<sup>10</sup>

It is clear that some firms are more effective at adapting to discontinuous changes in their environments than others, so the notion of dynamic capabilities has considerable merit. However, there continues to be a great deal of debate about how dynamic capabilities manifest themselves in practice. For Zollo and Winter, they manifest themselves in routines, or systematic patterns of behavior.<sup>11</sup> Eisenhardt and Martin propose that dynamic capabilities are manifested in processes, such as the new product development process or the acquisition process.<sup>12</sup> Teece argues that they are seen in “signature” practices that are distinctive to the firm, for example Toyota's lean production system or BP's peer review/peer assist practice.<sup>13</sup>

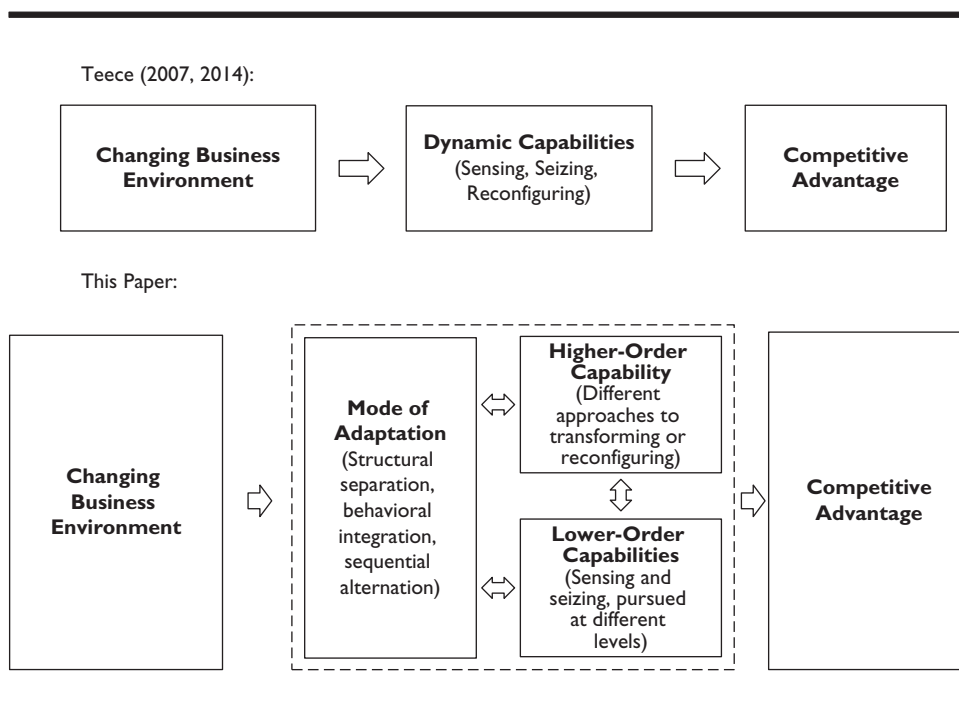
A related theoretical perspective in connection with discontinuities that has become quite popular in recent years is the notion of ambidexterity, which is defined as the capacity of an organization to address mutually conflicting demands in an effective way. This literature highlights three contrasting modes to reconcile the conflicting demands of exploration and exploitation: the *structural separation* of the two activities into different organizational units; the *behavioral integration* of the two activities within a single unit; and the *sequential alternation* between the two activities over time. Each of these approaches to ambidexterity has received a considerable amount of research attention over the last decade.<sup>14</sup>

O'Reilly and Tushman have argued that ambidexterity is a dynamic capability, on the basis that "the ability of a firm to simultaneously explore and exploit enables a firm to adapt over time."<sup>15</sup> While we agree with this statement, it does not provide sufficient analytical precision to be satisfactory. As noted above, ambidexterity transpires through three different modes, which suggests that the nature of the dynamic capabilities in each mode might also vary. For example, the capabilities a firm needs to manage activities that are separated into differentiated units are likely to be very different to those required when activities are integrated within the same unit. Our approach here is thus to view the ambidexterity and dynamic capabilities literatures as complementary, and to propose a conceptual integration between the two perspectives as follows (see Figure 1).

We suggest that it is useful to separate out Teece's three categories of dynamic capabilities (sensing, seizing, and reconfiguring) and to equate a "sensing" capability with exploration, and a "seizing" capability with exploitation. This leaves "reconfiguring" as a higher-order capability that involves choosing a mode of adaptation (structural separation, behavioral integration, or sequential alternation) to allow sensing and seizing to transpire, and then building the complementary reconfiguring capabilities to sustain that chosen model. In other words, whereas Teece envisioned sensing, seizing, and reconfiguring as forming an (approximately) linear sequence of same-order capabilities, we view sensing and seizing as lower-order capabilities and reconfiguring as a higher-order capability. While this distinction has not been made explicitly before, it does not appear to be inconsistent with Teece's worldview: for example, he noted that "dynamic capabilities result from superior top management *orchestration* skills,"<sup>16</sup> where orchestration is about how the various parts fit together.

To make this same argument in a slightly different way, by building on the ambidexterity literature we see the firm's "mode of adaptation" as an important and often overlooked design variable. We expect the appropriate mode of adaptation to vary with the circumstances (e.g., the specific organizational heritage of the firm and the nature of its external context requirements) and to demand its own distinctive set of capabilities. It is therefore the *combination* of the mode of adaptation and an associated set of capabilities that determines whether the firm is able to adapt to discontinuous change in its external environment (rather than a universal set of dynamic capabilities that would apply in all settings).

This conceptual framing serves to clarify our research strategy. In the remainder of this article, we take an inductive approach to the challenge of adapting to discontinuous change. We use the ambidexterity literature to focus on the three different modes of adaptation noted above, which helps us to identify suitable

**FIGURE 1.** Organizing Framework

firms to study; and we use the dynamic capabilities literature to guide our investigation of the nature of the capabilities these firms put in place to support their chosen mode of adaptation. As observed, sensing and seizing are direct counterparts to the notions of exploration and exploitation, while reconfiguring is, in our interpretation, a higher-order capability that enables firms to generate or “orchestrate” (in Teece’s own words) an appropriate balance between the two.

## Methodology

We approached our research questions by conducting three longitudinal comparative case studies. Case methods have been suggested for a broad variety of purposes, ranging from deductive theory testing to inductive theory development.<sup>17</sup> We have selected the latter approach, since it seemed more appropriate to shed light on the complex and previously understudied question of how firms make use of different organizational modes and their related dynamic capabilities to adapt to discontinuous change. Scholars have previously suggested that inductive theory development is particularly well suited to answer such “how questions.”<sup>18</sup> Furthermore, Edmondson and McManus argue that such inductive theory development is most appropriate for developing insights about a theoretically novel phenomenon.<sup>19</sup>

We first identified a set of industries that were marked by significant changes in terms of their underlying technologies, patterns of demand, and/or broader economic conditions, and we then sought to identify firms within these industries that had been at least moderately successful in adapting to those changing conditions.

These criteria helped us to select cases with similarly challenging industry contexts for subsequent case comparison.

As a next step, we followed Eisenhardt's influential work on case study research, which suggests that scholars may adopt a theory-based approach to sampling, so that cases are chosen to exhibit a certain level of variety with regard to the dimensions of interest.<sup>20</sup> Accordingly, our refined sampling of firms was driven by the need to cover the three different modes of adaptation (structural separation, behavioral integration, and sequential alternation). Since qualitative research requires good quality access to senior executives, we further selected a set of firms with reasonable geographic proximity to the authors. It is important to note that this approach to sampling is not driven by replication logic with generalizability as the primary objective, but rather aims at generating sufficient variety to develop new theoretical insights. The theory developed in this study sets the ground for subsequent theory testing based on larger samples.

Using the criteria described above, we selected the food, pharmaceutical, and automotive industries as suitable for our study. First, the food industry is marked by significant discontinuities, including emerging market consumer groups struggling with malnutrition and under-nutrition as well as developed market consumer groups looking for sophisticated nutritional solutions to enhance their health and wellbeing. Second, the pharmaceutical industry has been subject to increasing regulation and price pressure from governments, while the process of developing drugs has been radically transformed over the last twenty years by the biotechnology revolution. Finally, the automotive industry is marked by maturing demand, overcapacity, and fierce competition, and auto producers have had to adapt rapidly to realize continuous operational improvements while also exploring alternative transmission technologies and novel mobility concepts to meet changing political regulation and customer demands.

Within each of these industries, we focused on a case of a firm that had successfully managed at least one transition in the face of discontinuity. In the food industry, Nestlé was able to shift its focus from food towards nutrition, health, and wellbeing, reinventing existing product categories and establishing entirely novel ones such as sports nutrition, health nutrition, and micronutrient fortification. In the pharmaceutical industry, GSK has been one of the more successful "big pharma" firms in adapting to the biotechnology revolution, at least in part through a carefully orchestrated internal restructuring of its R&D activities. Finally, in the automotive industry, BMW became the global leader in the premium segment and one of the industry's fore-runners in new technologies (e.g., the all-electric i3 and the plug-in electric i8 vehicle models) and mobility solutions (e.g., the DriveNow car-sharing service). In all three cases, the chosen firms were relatively successful in adapting to discontinuities, securing or even improving their position among the leaders in their respective industries.

Aligned with our theoretical research question, these three companies used distinct modes to adapt to their dynamic environments through exploration and exploitation.<sup>21</sup> Nestlé relied primarily on a structural separation between the exploration-oriented nutrition and health businesses and its exploitation-oriented mainstream food businesses. GSK focused on the careful integration of its explorative and exploitative tasks, with a particular emphasis on developing a behavioral

context in its drug development operations that enabled employees to deal with both objectives simultaneously. Finally, BMW showed a history of repeatedly shifting attention from explorative activities (such as developing entirely new products and services) to exploitative activities (such as improving existing models and operational processes) and back. The different organizational approaches used by these three firms (structural separation, behavioral integration, and sequential alternation) allowed us to draw out some useful inferences about the capabilities that are instrumental to successfully adapting to discontinuous change.

We contacted all three companies and were able to conduct between 8 and 12 semi-structured in-depth interviews in each firm with respondents on multiple hierarchical levels, including front-line managers and top-level executives. Front-line managers, in our terms, are those overseeing single units or functions within a firm. Top-level executives, in contrast, oversee all activities in a firm and have a more cross-unit and/or cross-functional perspective. Based on this interview data and additional archival data sources, such as annual reports, case studies, and press coverage, we developed longitudinal case studies on how each firm had managed the adaptation to discontinuities. We then followed established coding procedures and created a list of first-order codes describing distinct attributes that facilitated the respective modes of adaptation pursued by the different firms.<sup>22</sup> Subsequently, these first-order codes were grouped into three categories, specifically vision, culture, and people development.<sup>23</sup> Finally, we engaged in a cross-case analysis to identify similarities and differences to refine our emerging theoretical framework of how firms adapt to discontinuous change (see Table 1 for an overview of the categories, related first-order codes, and illustrative quotes for the three cases).

An important point to note in the selection of firms was that it was hard to find a clear-cut case of behavioral integration. This is in large part because behavioral integration manifests itself in day-to-day behavior rather than in formal structures or processes, so it is less “visible” to the outsider than structural separation or sequential alternation. We ultimately selected GSK as the most suitable example because the change its executives put in place (the creation of “centers of excellence in drug discovery”) was all about pushing responsibility for making exploration-exploitation trade-offs closer to the front line. Compared to its competitors, GSK appeared to have gone furthest in getting its front-line managers to balance exploration and exploitation, rather than using a higher-level structure to ensure both were given due attention.

## Findings

The findings from our three case studies support the overall proposition, namely, that each distinct mode of adaptation has an associated set of dynamic capabilities that is specific to that particular mode. The modes differ with regard to the level within the organization where sensing and seizing capabilities are held, as well as the type of reconfiguring capabilities needed to effectively adapt to discontinuous change. We further found suggestive evidence that the chosen mode of adaptation and the related set of dynamic capabilities are closely linked to the

**TABLE I.** Higher-Order Capabilities for the Three Modes of Adaptation (continued on next page)

	<b>Nestlé (Structural Separation)</b>	<b>GSK (Behavioral Integration)</b>	<b>BMW (Sequential Alternation)</b>
<b>Higher-Order Capability</b>	Orchestrating the complex interplay of resources across differentiated organizational units	Shaping and reshaping a context in which the operating units can balance contradictory activities	Shifting the strategic focus over time and managing tensions between front-line and top managers
<b>Vision</b>	<p><i>Unifying Corporate Vision</i> (e.g., "Having a very clear vision is the essence of this company. Despite of all the variety that characterizes Nestlé, everybody understands what the road map is, who we are, and what we stand for." Manager Corporate Center)*</p> <p><i>Complementary Unit Objectives</i> (e.g., "The fact that there are separate units such as Nestlé Nutrition to address emerging opportunities means that our mainstream businesses can focus on driving profits in their established markets." Senior Manager Exploratory Unit)</p>	<p><i>Blended Vision</i> (e.g., "To improve the quality of human life by enabling people to do more, feel better, and live longer, through the enthusiasm of entrepreneurs, excited by the constant search for innovation, and valuing performance achieved with integrity." Corporate Website)</p> <p><i>Scale and Flexibility</i> (e.g., "There are times when you want to leverage your scale, and there are others where you want to be nimble and responsive." Senior R&amp;D Executive).</p>	<p><i>Long-Term Orientation</i> (e.g., "We ask ourselves how the cars will look like that we'll see on the streets in ten or fifteen years. This is how we define our strategic topics for innovation." Senior Manager BMW Car IT)</p> <p><i>Alignment</i> (e.g., "Alignment is key for our strategy development. It's not enough to discuss strategic topics, you also have to develop a common view on things." Manager Corporate Strategy)</p>
<b>Culture</b>	<p><i>Decentralization</i> (e.g., "Local units enjoy considerable decision-making autonomy. As a consequence, we have many different products targeted at local tastes and requirements. For example, we have over 200 local variations of Nescafé." Country Head)</p> <p><i>Company-Wide Collaboration</i> (e.g., "While it is a strength to be as decentralized as we are, there has to be some collaboration for developing capabilities. (...)</p>	<p><i>Entrepreneurial Orientation</i> (e.g., "Instead of a centralized command-and-control organization ... we've tried to return to something that says the unit that discovers the drug is the important thing." Senior R&amp;D executive).</p> <p><i>Commercial Focus</i> (e.g., "The new system gives me a much better handle on exactly why we are bothering to do a lot of the work." Senior R&amp;D Executive.)</p>	<p><i>Self-Reflection</i> (e.g., "We constantly strive for asking the questions that nobody has raised before." Manager Marketing)</p> <p><i>Asymmetric Interests</i> (e.g., "My task is it to ensure good and consistent overall innovation solutions. This is often in open or hidden conflict with the ambitions of others higher or lower in the hierarchy." Manager Innovation Management)</p>

(continued)

**TABLE I.** Higher-Order Capabilities for the Three Modes of Adaptation (continued from previous page)

	<b>Nestlé (Structural Separation)</b>	<b>GSK (Behavioral Integration)</b>	<b>BMW (Sequential Alternation)</b>
	For example, obesity is an issue in several markets. We collaborate strongly on this issue to align our activities across the concerned businesses and countries." Member of the TMT)	<i>Transparency</i> (e.g., "We need cross-pollination ... we work for GSK, we don't want to put walls up." R&D Manager)	<i>Common Identity</i> (e.g., "BMW is a highly technophile company. The excitement for new technical solutions is strongly present on all levels in the firm. This is the glue that holds us together." Manager Corporate Strategy)
<b>People Development</b>	<i>Multiple Career Tracks</i> (e.g., "We have specialists who follow either the standard or the entrepreneurial career track. Yet, there are also people who experience both types of roles during their careers. These people are later particularly promising candidates for corporate roles since they can translate between both worlds." Head of Exploratory Unit)  <i>Long-Term Career Development</i> (e.g., "We do not want 'butterfly managers' who come for 2 or 3 years, make a big change, and then get hired away to do the same thing elsewhere. People here know that if they do something, they are going to be around to witness the consequences. That leads to more inclusive and long-term thinking." Head of Corporate Unit)	<i>Leaders with Blended Skills</i> (e.g., "We have aggressively embarked on a program to build a cadre of exceptionally gifted individuals ... They love the science, show passion in their desire to win, have the resilience to soldier on." CEO; "For the first few years, we struggled to find scientists with the commercial skills to make the CEDDs work, we had to pull in quite a few people from outside." Senior Commercial Manager)  <i>Accountability</i> (e.g., That's the thing about the DPU. You own it more, so you're worried about the future of your domain." Senior R&D Manager)	<i>Formal Networks</i> (e.g., "We strive for developing a network-based organization. The objective is that projects and units can access key functions without having to rely on reporting lines. This works already well informally, but we want to more actively develop it." Manager Internal Consulting)  <i>Job Rotation</i> (e.g., "It was important to us to facilitate the change of people from innovative units into the regular business and vice versa. Therefore, we realized that we had to make positions and hierarchical levels comparable across the organization." Manager Corporate Center)

\* The quotes in this table are drawn from personal interviews with executives at GSK as well as the following archival sources: J-P. Gamier, "Rebuilding the R&D Engine in Big Pharma", *Harvard Business Review*, 2008/May: 69-76; S. Stovall, "Glaxo Scientists Brush Up on Sales Pitches", *Wall Street Journal*, October 11th 2011; A. Torsoli, "Glaxo Scientists Live or Die with Project in Research Overhaul", November 30th 2011.

firm's organizational heritage, reflected in its prevailing vision, culture, and people development model.

### ***Nestlé: Focus on Structural Separation***

For several decades, slow growth and relative stability characterized the food industry, with new products developed and introduced on a regular basis, but with only gradual changes in consumer demands. During the past fifteen years, however, awareness of food has changed dramatically, with consumers in the developed world increasingly evaluating it in terms of health and wellbeing rather than taste alone. At the same time, the increasing globalization of the food industry has resulted in entirely new challenges. Consumers in developing countries have very different nutritional requirements than those in the developed world. Micronutrient deficiencies are amongst the major causes of disease burdens in developing countries. Global food companies are increasingly expected to address these health issues by fortifying their product ranges with micronutrients. In a nutshell, food companies are facing the dual imperatives of continuing to exploit their ongoing operations in established markets, while additionally exploring entirely new markets, customer groups, and demands.<sup>24</sup>

In this challenging environment, the Swiss food company Nestlé has taken a leadership position by changing its focus from food towards nutrition, health, and wellbeing. Nestlé has primarily applied the *structural separation* mode of adaptation, which implies that explorative and exploitative activities are pursued in structurally separated units.<sup>25</sup> One example is the establishment of the independent Nestlé Nutrition unit that is responsible for developing entirely novel nutritional offerings for customer groups with special needs, such as athletes. Another example is Nestlé Health Science as an independent, but fully-owned, subsidiary within Nestlé, which focuses on medical patients' distinct nutritional needs. These two units played a very active role in helping to address over-nutrition, under-nutrition, and related micronutrient deficiencies, as well as obesity and non-communicable or non-contagious diseases—pressing issues that affect billions of people around the world. In parallel, Nestlé has continued to operate a highly efficient structure for its mainstream food businesses, based on strategic business units and geographical zones that are strongly focused on ensuring profitable operations.

Why was this the right way to go for Nestlé and what dynamic capabilities were responsible for the firm's success with this mode of adaptation? To answer this question, we talked at length to key decision makers and were able to identify distinct attributes of Nestlé's higher-order capability that enabled its structural separation mode of adaptation. We also found that the company's vision, culture, and people development model played important roles in building and reinforcing this particular higher-order capability.

As one top manager explained, "The vision of transforming Nestlé into a leader in Nutrition, Health, and Wellness provides focus to all our activities. We pursue the dual objectives of developing nutrition as a value-added in our established food businesses and exploring new opportunities in the specialty nutrition markets." While a strong vision serves to unify all employees behind the common cause, each specific unit has its own distinct, but complementary set of goals. A manager at the

corporate center explained, “It is like a fleet of agile ships with different missions. The new units steer into the specialty nutrition markets, which are uncharted waters for us. In the meantime, the mainstream units defend our traditional fishing grounds.” However, as the former CEO states, the integration of these dual objectives is essential for success: “We have to deploy past experiences while staying focused on current execution and, at the same time, shape the future. The greatest challenge for our top managers is to enable the organization to achieve the right balance between these objectives.” In sum, the complementary objectives allow Nestlé to create sensing or seizing capabilities in different parts of the organization, while the unifying vision serves to align the goals of the company as a whole.

Moreover, Nestlé’s differentiated units benefit from the company’s decentralized culture. As one informant explained, “Our decentralized culture is particularly important since changes in consumer demands vary strongly between markets....Decentralization means that front-line units are free to establish the specific capabilities they need.” For example, the explorative units largely rely on capabilities to identify opportunities and threats in the environment and address these through novel product ranges. For this purpose, these units have established relational ties and more formal collaborations, such as a \$500 million investment into biomedical research at the Ecole Polytechnique Fédérale de Lausanne (EPFL). At the same time, however, our informants also stressed the importance of internal collaboration across units. As one R&D manager explained, “The ‘wellness champions’ in our collaborative network come from different business units and meet regularly with the top management. Together, they discuss recent research findings, evaluate market developments, and derive opportunities.” Another collaborative effort was to integrate so-called “Branded Active Benefits” (compounds with specific nutritional effects) into multiple divisions’ products. For example, the LC1 bacteria that counter digestive malfunctions were introduced in distinctively branded yogurts, mueslis, and drinks. The emphasis on collaboration has helped Nestlé to turn opportunities, which had first originated from the exploratory units, into marketable products for its mainstream businesses.

Nestlé has realized that its traditional people development models have tended to focus too strongly on optimizing existing businesses. In order to overcome this shortcoming, the firm has established a separate career track for entrepreneurial leaders that allows those with strong sensing capabilities to build a successful career within Nestlé. The head of one exploratory unit explained, “Before we introduced the separate career track for entrepreneurs, people like me had a hard time to progress at Nestlé because we have our competences in areas that traditional businesses within Nestlé value less.” The two career tracks are now part of Nestlé’s long-term-oriented career development program. As one corporate manager explained, “Nearly everybody at the headquarters has had a long career at Nestlé with assignments in different functions, countries, and divisions. That provides them with the oversight and long-term focus that is needed to pursue our vision and ensure that we all work together striving for the same things.” Another senior manager added, “What is truly unique at Nestlé is our belief in people, keeping them, and really nurturing their careers. I have been here 26 years and Nestlé did everything to give me the varied experiences I need to excel in my current role at the corporate center. While I am

at the corporate center now, I know exactly how the country or line managers think and how to motivate them to work together at the group level.”

Linking these insights back to the dynamic capabilities framework, it becomes evident that Nestlé’s ability to cope with discontinuous change is based on developing sensing capabilities through its exploration-oriented units and seizing capabilities through its exploitation-oriented operating units. Sitting above these is a *resource-linking capability* for orchestrating the complex interplay of sensing capabilities in the exploration-oriented units and seizing capabilities in the exploitation-oriented units. In Teece’s terminology, this resource-linking capability can be thought of as a reconfiguring capability.

This higher-order capability is arguably key to Nestlé’s long-term success, because it ensures that the firm’s capabilities are deployed in an effective manner. It is reinforced by the company’s vision, culture, and people development model. As described above, the overarching vision makes it possible for managers to integrate the differentiated units’ complementary objectives into a shared picture of the future and thus facilitate coordination across different parts of the organization. At the same time, the emphasis on collaboration in a strongly decentralized culture has helped executives to not only develop distinct sensing and seizing capabilities in different parts of the organization, but also integrate these capabilities for mutual benefit. Finally, the long-term career development model with the legitimization of different career tracks has helped Nestlé attract and retain high-potential and specialized individuals who contribute their complementary skills to the capability development.

### ***GSK: Focus on Behavioral Integration***

Throughout the 1970s and 1980s, the global pharmaceutical industry was characterized by exceptionally high levels of profitability, thanks to a steady stream of new drug developments, high barriers to entry, and relatively benign market conditions, with governments and private healthcare providers accepting high prices for innovative drugs. Over the last twenty years, the industry has faced challenges on two sides. On the demand side, governments and consumers have pushed for more cost-effective treatments to contain the costs of healthcare and to make drugs more affordable in developing countries. On the supply side, the number of new “blockbuster” drugs coming through the established R&D process in “big pharma” has declined, while the biggest growth opportunities have emerged in the biotechnology area, which requires very different methods and skills from those used in traditional R&D.

For established big pharma firms, the changes in the industry since the early 1990s have put them under considerable pressure. There have been many large acquisitions (e.g., Pfizer buying Warner-Lambert, Pharmacia, and Wyeth) as a way of improving economies of scale and increasing bargaining power. There have also been major changes to R&D through new process technologies (e.g., combinatorial chemistry, high throughput screening), new discovery methods (e.g., improved knowledge of molecular biology), and new organizational models (e.g., alliances with biotech firms, in-licensing deals, university partnerships). In sum, big pharma companies, like food companies, have had to experiment with new business models

while also continuing to work with their old models, and this has created organizational and managerial challenges.

GlaxoSmithKline (GSK) has been at the forefront of these industry changes, and an important thrust of its transformation over the last fifteen years has been its application of the *behavioral integration* mode of adaptation, which means pushing decision making about tradeoffs between exploration and exploitation down to lower levels in the organization where, arguably, those tensions can be best resolved.

This mode of adaptation is most clearly manifested in the 2001 implementation of an innovative organizational model based on six “Centers of Excellence in Drug Discovery” (CEDDs). The traditional R&D model in the pharmaceutical industry was based on deep functional silos with an emphasis on specialized expertise and academic excellence, but it was slow-moving and collaboration was limited. The emerging biotech R&D model, in contrast, involved small cross-functional teams working together in a flexible and responsive way. The intention behind the CEDDs was to create “an R&D organization that benefited from the best characteristics that big pharma and small biotechs had to offer.”<sup>26</sup> The CEDDs had 300 to 350 scientists—a mix of chemists, biologists, physicians, and clinical researchers—and their mandate was to discover new drugs in specific disease areas (e.g., neurology or antibacterial/host defense). The CEDDs competed with one another for corporate funding, and incentives were provided for bringing candidate drugs through to the “proof of concept” stage, and establishing their potential commercial viability. This model therefore encouraged a higher level of collaboration across functions—it was a structure designed to promote integration, whereas the structures we observed at Nestlé were designed to promote differentiation. The model assumed, according to one observer, “that smaller focused, autonomous, and more accountable units would make more efficient decisions regarding portfolio advancement.”<sup>27</sup>

Following a review in 2007, GSK took the learning from its CEDD model one step further and created a new model based on “Drug Performance Units” (DPUs), small cross-functional teams of 30 to 40 people focused on single projects (which again included both exploration- and exploitation-oriented elements). Once more, each DPU was required to apply for funding in direct competition with other DPUs. In 2008, there were 38 internal DPUs within GSK, and a further 50 DPUs operated in partnerships with external entities. DPUs were evaluated after three years on how successful they were at meeting the scientific and commercial goals of their project, at which point they were invited to apply for additional funding.

Our research (based on both interviews and secondary sources) showed how this mode of adaptation was closely linked to GSK’s specific higher-order capability enabling the behavioral integration. Once more, the company’s particular vision, culture, and people development were crucial in developing this capability.

GSK’s overall vision is “to improve the quality of human life by enabling people to do more, feel better, and live longer, through the enthusiasm of entrepreneurs,

excited by the constant search for innovation, and valuing performance achieved with integrity.”<sup>28</sup> In our interviews, GSK executives observed that this unitary vision is primarily about blending science-led innovation and entrepreneurial orientation. There was also a strong view that GSK needed to be both “big and small at the same time” which was a large part of the impetus behind the creation of the CEDDs and then the DPUs.

In terms of culture, the change process—that the CEDDs and DPUs were part of—was about shifting the mindset of R&D scientists and managers towards the commercial potential of their discovery work. Rather than retaining chemists, biologists, and commercial people in their functionally separated silos, GSK pulled them together to work in focused, cross-functional teams to enable cross-pollination. The objective was to empower those on the front line—which here means the R&D managers responsible for a drug-discovery project—in order to make smarter choices about how to spend the company’s money. In the traditional big-pharma way of working, discussions about the relative emphasis on research and commercial activities were resolved at the very highest level; in the new model, the frontline CEDD/DPU teams made those decisions directly. They decided how to divide their time between exploration-oriented and exploitation-oriented activities because they were accountable for the consequences of those decisions.<sup>29</sup> To foster this accountability, there was a high level of transparency, with periodic reviews of the performance of DPUs that were shared across the organization (for example, in February 2012, three DPUs were closed down and four additional ones were created).

In terms of people development, this mode of adaptation required its executives to have a particular set of capabilities. The front-line managers running the CEDDs (and subsequently the DPUs) were responsible for both sensing and seizing opportunities, in effect by acting as entrepreneurs seeking to use the deep scientific knowledge in their teams to address unresolved medical needs, and they were accountable for their overall results. During the early 2000s, the company did not have enough such people,<sup>30</sup> and a considerable effort went into hiring from the outside (often from biotech companies) and developing internal talent. The top executives, in contrast, were responsible for overseeing the novel structure they had developed to ensure that it provided the right balance between exploration (basic science) and exploitation (commercialization), and to reconfigure it over time according to external and internal needs. For example, the decision to break up the CEDDs and create smaller DPUs was one example of how top executives reshaped the context. Other adjustments included bringing in external hires from the biotechnology world to provide stronger commercial skills during the mid-2000s, and fine-tuning of the compensation scheme to ensure that managers on the front line were truly accountable for their actions as their incentives were aligned to their centers’ or units’ goals. It is important to underscore that GSK was alone among the big pharma companies in adopting this integrated model during the 2000s, though in recent years a few competitors such as AstraZeneca have started to copy their approach. As one observer commented, GSK has a “unique research and development structure that looks less like peers Merck and Pfizer and more like a fledgling biotech start-up.”<sup>31</sup>

Linking back to the dynamic capabilities framing, the case evidence strongly indicates that GSK's ability to cope with discontinuous change is based on highly innovative front-line units (CEDDs and later DPUs) that developed both sensing and seizing capabilities. Sitting above these is a top-executive level *context-shaping capability* for developing and adapting the organizational contexts in which the front-line units sense and seize opportunities.

This particular reconfiguring capability is an important element of GSK's enduring success. Like the Nestlé case, GSK's capability is linked to its vision, culture, and people development model.<sup>32</sup> The company's vision makes it clear that technical and commercial expertise are equally important, which makes it easier for managers to build processes that enable their teams to decide for themselves how to best divide their time and resources between tasks. This dual orientation is also incorporated in the company's culture, through such principles as transparency, mutual learning, and support. GSK's success in hiring and developing people with a blend of skills ensures that they have the right people to establish these behavioral organizational contexts on all hierarchical levels throughout the company.

It is worth noting that GSK was created from a merger of several smaller companies (Glaxo, Wellcome, SmithKline, and Beecham) during the 1990s, and some of these companies had stronger commercial skills (e.g., Glaxo) while others were stronger in R&D (e.g., Wellcome). GSK's vision, culture, and people development model therefore emerged from a conscious process of integration, in which the company's managers sought to gain a careful balance between scientific excellence and commercially minded entrepreneurship. Arguably, this particular heritage was helpful for making it possible for GSK's top executives to develop their context-shaping capability.

### ***BMW Group: Focus on Sequential Alternation***

The global automotive industry has been highly competitive for many decades, with manufacturers seeking to combine best-in-class efficiency while also developing a steady stream of new products. These innovations historically focused mostly on driving performance, safety, and comfort. In recent years, there has been a shift towards addressing more fundamental challenges, for example the increasing customer, political, and regulatory pressures to create more fuel-efficient vehicles and to develop alternative, environmentally friendly transmission technologies. Customers have also begun to search for more flexible mobility solutions, challenging the automotive industry's traditional ownership-based business model.

In this new environment, BMW has become the global market leader in the premium car segment, and one of the forerunners with regard to electric cars and new mobility solutions. BMW's mode for dealing with the discontinuities in its environment is best described through the concept of *sequential alternation*. Prior ambidexterity research suggests that organizations that strive to reconcile explorative and exploitative strategic objectives and their contradictory organizational requirements may benefit from alternating between modes that foster one or the other objective at different points in time. By "vacillating" between discrete organizational arrangements, firms can dynamically increase the levels of exploration and exploitation and thereby enhance long-term performance.<sup>33</sup>

We started our research after BMW had divested its loss-making Rover and Land Rover brands in 2000. In the following period, the main focus of the firm was on reestablishing profitability. Under CEO Joachim Milberg, the company refocused on its profitable core business, with a strong emphasis on enhancing productivity and administrative efficiency. As a result, BMW became the world's most profitable full-range car manufacturer. This focus changed between 2002 and 2006, when CEO Helmut Panke led one of the largest product expansions in BMW's history. The firm entered the small premium car segment with the launch of its 1-Series car model and the re-launch of the MINI brand. It also moved into the luxury segment with the launch of the Rolls-Royce Phantom, extended its position in the SUV market with the launch of the X3 model, and revived a historical vehicle class with the 6 Series Coupé.

After Norbert Reithofer took over as CEO in 2006, BMW changed again and began to emphasize profitable growth in its established product segments. In the subsequent years, BMW overtook its German rival Mercedes in terms of unit sales and profitability, and became the global market leader in the premium car segment. In 2010, Reithofer finally refocused the organization once more on "shaping the future," resulting in a wave of radical innovations. In the next four years, BMW created a range of electric vehicles including the i3 all-electric car and the i8 hybrid sports car. BMW also developed and launched a range of entirely new mobility solutions, including its DriveNow premium car sharing business.<sup>34</sup>

Why did BMW executives choose to engage in these regular shifts of their strategic priorities and how were they able to do so successfully? Our in-depth interviews with some of the key decision makers indicate that there was again a very distinct higher-order capability in place with attributes grounded in the firm's vision, culture, and people development model that enabled and fostered this particular mode of adaptation.

BMW's vision "to be the leading provider of premium products and services for individual mobility" can only be achieved through long-term orientation and the dedication to continuous adaptation. This is also reflected in and supported by the firm's ownership structure. The fact that the German Quandt family has owned nearly half of BMW's shares since the 1960s allows the company to think beyond quarterly or even yearly results. At the same time, the top executives have spent considerable effort to make sure that everybody in the company is strongly aligned behind the strategic priorities. A senior manager from the Mobility Service Unit emphasized, "Of course we do things that, for example, the sales organization is not excited about, like pushing more cars in the lower price range. Still, we get support everywhere because we have the full backing from the board, which makes sure that everybody is committed to contribute to this new way of doing business." The long-term vision spans across phases with different priorities, which is important to make sure that changes are not simply reactions to short-term problems, but rather follow a proactive long-term strategic logic. At the same time, strong organizational alignment ensures that the entire company consistently follows the strategic shifts.

An additional driver for BMW's successful sequential alternation is its culture that encourages employees to critically reflect on their own strengths and

continuously question the status quo. During our interviews, we observed that managers and employees rarely expressed satisfaction with their past success. Rather, and particularly in times of success, the organization appears to be constantly searching for improvements and questioning whether it is still on the right track. Reithofer observed in his opening speech for the 2014 annual meeting that one of the key attributes of companies such as BMW is that “they are never complacent about what they have achieved.”

This highly reflective culture is further emphasized by the fact that individuals within and across different hierarchical levels often have asymmetric interests, meaning that they need to engage in internal negotiations about the best way forward. For example, in the phase between 2006 and 2010, when front-line managers were working hard to optimize BMW’s continuous profitable growth in its established model range, the top executives began to meet with customers, industry experts, and researchers to discuss the future of mobility. As one senior manager recalls, “We conducted a lot of analyses to find out what happens in 25 years, which trends we see in the future. Based on these analyses, we did brainstorming across hierarchical levels and identified multiple hot topics that were then reported back to and discussed in the board.” This allowed BMW’s top executives to identify the right moment to shift the organization’s attention focus back towards innovation. In a sense, BMW’s culture thus fosters internal conflicts, which raise awareness and contribute to the ability to identify the right moment for adapting the strategic orientation. At the same time, the common identity ensures that these conflicts are constructive in nature and directed towards a common long-term goal. As a MINI manager emphasizes, “Identification with the company, the technology, and the product are really key. If people feel that this is a great firm and a great car, they are also willing to overcome conflicts of interest.”

Finally, BMW also emphasizes people development, especially to build strong internal networks. Based on its technology-driven heritage, BMW leadership teams are typically composed of managers with different backgrounds, perspectives, and competencies. In the case of the MINI re-launch, for example, a virtual management board was set-up. As a MINI manager describes, “Our virtual board consists of the head of MINI marketing, the head of development for the product line, and the factory director from Oxford where the car is assembled. They discuss important issues and bring together different perspectives to develop a unique MINI point of view.” The virtual management board allowed decision makers to put themselves into different roles, take different perspectives, and establish close ties with their colleagues. Similarly, a new Mobility Service Unit was set up, where experienced managers from different departments were brought together who jointly engaged in developing their internal and external networks to find and implement entirely novel business ideas and technologies. As a former senior manager recalls, “It was very important that we had access to BMW’s (functional) structures. For example, when we needed market research, we went to the marketing department....If we had needed to finance all these services as an independent start-up, we would probably not be alive today.” Besides the establishment of such formal network structures, which foster collaboration and mutual support across organizational boundaries, managers also rotate to new positions in different group

divisions every three to five years, allowing them to establish close informal relationships across the organization. As one senior executive from Corporate Strategy argued, “Particularly innovative projects are often driven by strong informal networks between people that sometimes know each other for twenty years. These close personal relationships allow for fast direct support without having to go through the formally regulated exchange process.”

In terms of the dynamic capability perspective, it is interesting to note that all individuals within the company, from front-line managers to top executives, develop sensing and seizing capabilities (unlike the Nestlé and GSK cases where sensing and seizing were essentially front-line capabilities). During exploitative phases, front-line managers rely primarily on seizing capabilities, whereas top executives emphasize their sensing capabilities to identify the right moment and prepare the organization for the shift towards an exploratory focus. Conversely, during explorative phases, front-line managers primarily deploy their sensing capabilities, while top executives emphasize seizing capabilities, to prepare the organization for a shift back to exploitation. Overall, the higher-order capability that makes this possible can be described as a *focus-shifting capability*, in that it allows executives and front-line managers to transition from seizing to sensing and back over extended periods of time.

This focus-shifting capability is grounded in the company’s vision providing both a very long-term orientation and a strong temporary alignment of strategic direction. This allows managers to frame changes in focus as distinct phases within a long-term strategy and thus to avoid the impression of reactive strategizing. Furthermore, identifying the right moment in time to shift from one focus to the other requires a culture that constantly questions the status quo and where individuals in the organization are continuously negotiating to reconcile divergent interests. Finally, developing well-connected leadership teams fosters mutual support among employees and managers on all organizational levels, and thus helps individuals master the challenges related to repeated change.

## Discussion

The three cases described above illustrate that a firm’s adaptation to discontinuities in its environment might be more complex than sometimes assumed. Organizations not only need to choose which mode of adaptation is most appropriate to their particular setting and their heritage, they also need to develop closely aligned sets of dynamic capabilities across hierarchical levels to support and sustain their chosen mode of adaptation.

These findings suggest two important extensions to current thinking on dynamic capabilities. First, we propose a contingency perspective. Some studies have suggested that a generic set of dynamic capabilities can be applied to all settings<sup>35</sup>, while other researchers have highlighted the boundary conditions that enable firms to benefit from the potential value of dynamic capabilities.<sup>36</sup> Our findings suggest, instead, that the specific sets of capabilities needed to adapt to discontinuous change appear to vary with the chosen mode of adaptation.

In particular, our study emphasized the different forms of “reconfiguring” capability that are observed in practice. In order to make structural separation

work, Nestlé developed a resource-linking capability for orchestrating the interplay of sensing and seizing capabilities across its operating units. To adapt through behavioral integration, GSK developed a context-shaping capability that enabled its operating units to sense and seize opportunities at the same time. To make sequential alternation work effectively, BMW built a focus-shifting capability, which allowed it to shift its relative emphasis on sensing and seizing activities over time.

In each of these cases, we observed that the heritage of the firm (manifested in attributes of its vision, culture, and people development) supported the chosen mode of adaptation and the development of the relevant capabilities (Table 1). For example, Nestlé's capacity to build a resource-linking capability was enhanced by a culture of decentralization, while BMW's focus-shifting capability was facilitated by a culture of self-reflection and a technophile identity. However, there were also times when the chosen mode of adaptation helped the firm to make changes to its culture and its people development model. For example, by developing its new integrative approach to drug discovery, GSK was able to reinforce a culture that blended science and entrepreneurship, and to develop people with the necessary commercial skills.

The link between these broader organizational attributes and the mode of adaptation is therefore not deterministic. Our evidence suggests a particular organizational heritage makes it more likely for a firm to choose one mode of adaptation over another, but there is also scope for strategic choice on the part of the firm's top executives—to consciously select a new mode of adaptation and to make complementary adjustments to all these other organizational attributes as well. Particularly in a case such as GSK, which was formed through a merger, there is considerable scope for the chosen mode of adaptation to influence such things as the firm's vision, culture, and people development model.

This discussion opens up an important question about the time frame in which capability building occurs. For our three firms, the process of adaptation played out over a 10- to 15-year period, and our interpretation is that the executives in these firms were wise to mostly focus on one mode of adaptation and to stick with it, just because it takes a long time for capabilities to develop. However, it is worth considering whether an even longer time frame might have allowed us to see firms evolving from one higher-order capability to another higher-order capability, perhaps in response to a change in ownership or a major downturn in performance.<sup>37</sup> We strongly encourage future research in this direction to study if and how higher-order capabilities might evolve over long periods of time.

Second, we show how conceptually linking the notions of dynamic capabilities and ambidexterity allows us to shed additional light on the multi-level nature of dynamic capabilities. Teece proposed that dynamic capabilities could be broken down into three categories, namely, sensing, seizing, and reconfiguring. Our case studies show how sensing and seizing are typically front-line capabilities, developed and implemented by those managing operating units, while reconfiguring is typically a higher-order capability, developed and implemented by top executives as a way of getting the right level of coordination and balance between sensing and seizing across the operating units. This distinction holds true when the chosen

mode of adaptation is structural separation (Nestlé) or behavioral integration (GSK). However, in the case of sequential alternation (BMW), sensing and seizing capabilities are seen at both front-line and top executive levels, while the reconfiguring capability is, once again, held exclusively by those at the top executive level (see Table 2).

Our study contributes to the literature on ambidexterity as well. While there have been many research papers on ambidexterity in organizations over the last fifteen years, each one has—almost without exception—focused on a single approach to ambidexterity (i.e., structural separation, behavioral integration, or sequential alternation). Markides recently brought forward an important question that arises from these different options, namely, “what is the optimal strategy for a given firm?”<sup>38</sup> By comparing the three approaches in the context of discontinuous change, our evidence opens up an interesting line of inquiry into the distinct nature of the capabilities firms need to reconcile the conflicting pressures for exploration and exploitation. Rather than suggesting that one approach is inherently more effective than others, our evidence suggests the challenge for the firm is to make a choice that is appropriate to its environmental context and organizational heritage, and to develop the complementary set of capabilities that enable it to be effective. This resonates well with earlier work by Harreld and colleagues who suggest that “a key leadership element is the importance of fit or complementarity among strategy, structure, culture, and process.”<sup>39</sup>

By identifying the distinct higher-order capabilities that allow top executives to transform the firm, we further respond to recent calls by Birkinshaw and Gupta, as well as by O'Reilly and Tushman, for more insights into the nature of managerial capability to achieve ambidexterity, as well as for more inductive research on how leaders may orchestrate the allocation (and reallocation) of resources between old and new business domains.<sup>40</sup> We hope that our insights guide future research to

**TABLE 2.** Levels Where Dynamic Capabilities Are Held

	<b>Sensing</b> Identification and assessment of threats and opportunities	<b>Seizing</b> Mobilization of resources to address threats and opportunities	<b>Reconfiguring</b> The continuous renewal of a firm's tangible and intangible assets
<b>Structural Separation</b> (e.g., Nestlé)	Explorative capability, held primarily at the front line in dedicated units	Exploitative capability, held primarily at the front line in dedicated units	Resource-linking capability, held primarily at the top-executive level
<b>Behavioral Integration</b> (e.g., GSK)	Explorative capability, held primarily at the front line across the entire organization	Exploitative capability, held primarily at the front line across the entire organization	Context-shaping capability, held primarily at the top-executive level
<b>Sequential Alternation</b> (e.g., BMW)	Explorative capability, sequentially held at the front line and the top-executive level	Exploitative capability, sequentially held at the front line and the top-executive level	Focus-shifting capability, held primarily at the top-executive level

explore in greater detail how the organizational heritage (i.e., vision, culture, and people development) is shaped over time and how and to what extent senior executives play an active role in this process.

Of course, this discussion still leaves open the question of how a company chooses among these three modes of adaptation. Recent research has shown that the decision to develop an ambidextrous ability may not only be taken top-down by senior executives, but can also emerge bottom-up, initiated by front-line managers and employees.<sup>41</sup> Accordingly, if there is an overarching capability that enables some firms to make better choices than others, our hunch is that this capability may be held on multiple hierarchical levels and may potentially be wrapped up in the decision makers' self-awareness and sensitivity to context and heritage. However, this is ultimately an issue that future research needs to address.

A final observation links back to the original framing of this article, as a study of how firms adapt to "discontinuous change." While the three firms we studied were, of course, subject to such changes in their operating environments, they did not face an immediate "existential threat" of the type that hit Kodak, Blockbuster, or Nokia, at least not during the period we studied them. It is therefore a matter of speculation as to whether the capabilities these firms developed would have been sufficiently robust to cope with more extreme forms of disruptive changes. We would encourage future work to look explicitly at the "extent" of discontinuity to establish, for example, whether some modes of adaptation are more robust than others.

Summarizing, our study aimed at contributing to dynamic capability research by shedding light on how sensing, seizing, and reconfiguring capabilities become effective in practice and how they may differ depending on the firm's selected mode of adaptation to discontinuities. We strongly encourage researchers and practitioners alike to think more carefully about what capabilities are needed in different settings, whereabouts in the organization these capabilities should be held, and how they might have to change over time. It is our hope that these insights on the nature of dynamic capabilities helps established firms to improve their track record of successfully adapting to discontinuous changes.

## Notes

1. See for example C.M. Christensen, *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail* (Boston, MA: Harvard Business School Press, 1997); M.L. Tushman and C.A. O'Reilly, "The Ambidextrous Organization: Managing Evolutionary and Revolutionary Change," *California Management Review*, 38/4 (Summer 1996): 8-30.
2. See D.J. Teece, "Explicating Dynamic Capabilities: The Nature and Microfoundations of (Sustainable) Enterprise Performance," *Strategic Management Journal*, 28/13 (December 2007): 1319-1350.
3. See Teece (2007), op. cit.; D.J. Teece, "A Dynamic Capability-Based Entrepreneurial Theory of the Multinational Enterprise," *Journal of International Business Studies*, 45/1 (January 2014): 8-37.
4. For an overview, see S. Raisch and J. Birkinshaw, "Organizational Ambidexterity: Antecedents, Outcomes, and Moderators," *Journal of Management*, 34/3 (June 2008): 375-409.
5. See S. Raisch, J. Birkinshaw, G. Probst, and M.L. Tushman, "Organizational Ambidexterity: Balancing Exploitation and Exploration for Sustained Performance," *Organization Science*, 20/4 (2009): 685-695; C.A. O'Reilly and M.L. Tushman, "Organizational Ambidexterity: Past, Present, and Future," *Academy of Management Perspectives*, 27/4 (November 2013): 324-338.

6. K. Eisenhardt and J. Martin, "Dynamic Capabilities: What Are They?" *Strategic Management Journal*, 21/10-11 (October/November 2000): 1105-1121; Teece (2007), op. cit.
7. Christensen (1997), op. cit.; Tushman and O'Reilly (1996), op. cit.
8. For the introduction of the dynamic capability concept, see D.J. Teece, G. Pisano, and A. Shuen, "Dynamic Capabilities and Strategic Management," *Strategic Management Journal*, 18/7 (August 1997): 509-533. The concept has subsequently been developed, for example, by D.J. Teece, "Reflections on 'Profiting from Innovation,'" *Research Policy*, 35/8 (October 2006): 1131-1146; Teece (2007), op. cit.; Teece (2014), op. cit.; Eisenhardt and Martin (2000), op. cit.; C.E. Helfat, S. Finkelstein, W. Mitchell, M. Peteraf, H. Singh, D. Teece, and S. Winter, *Dynamic Capabilities: Understanding Strategic Change in Organizations* (Malden, MA: Blackwell, 2007); C.E. Helfat and M.A. Peteraf, "Understanding Dynamic Capabilities: Progress along a Developmental Path," *Strategic Organization*, 7/1 (February 2009): 91-102; C.E. Helfat and S.G. Winter, "Untangling Dynamic and Operational Capabilities: Strategy for the (N)ever-Changing World," *Strategic Management Journal*, 32/11 (November 2011): 1243-1250; M. Peteraf, G. Di Stefano, and G. Verona, "The Elephant in the Room of Dynamic Capabilities: Bringing Two Divergent Conversations Together," *Strategic Management Journal*, 34/12 (December 2013): 1389-1410; S.G. Winter, "Understanding Dynamic Capabilities," *Strategic Management Journal*, 24/10 (October 2003): 991-995; M. Zollo and S.G. Winter, "Deliberate Learning and the Evolution of Dynamic Capabilities," *Organization Science*, 13/3 (2002): 339-351.
9. G. Cepeda and D. Vera, "Dynamic Capabilities and Operational Capabilities: A Knowledge Management Perspective," *Journal of Business Research*, 60/5 (May 2007): 426-437; D. Teece, "The Foundations of Enterprise Performance: Dynamic and Ordinary Capabilities in an (Economic) Theory of Firms," *Academy of Management Perspectives*, 28/4 (November 2014): 328-352.
10. B. Harreld, C. O'Reilly, and M. Tushman, "Dynamic Capabilities at IBM: Driving Strategy into Action," *California Management Review*, 49/4 (Summer 2007): 21-35.
11. Zollo and Winter (2002), op. cit.
12. Eisenhardt and Martin (2000), op. cit.
13. Teece (2014), op. cit., as described in L. Gratton and S. Ghoshal, "Beyond Best Practice," *MIT Sloan Management Review*, 46/3 (Spring 2005): 49-57.
14. For an overview, see Raisch and Birkinshaw (2008), op. cit.; Raisch, Birkinshaw, Probst, and Tushman (2009), op. cit. Also, for explicit consideration of the temporal nature of ambidexterity, see Z. Simsek, C. Heavey, J.F. Veiga, and D. Souder, "A Typology for Aligning Organizational Ambidexterity's Conceptualizations, Antecedents, and Outcomes," *Journal of Management Studies*, 46/5 (July 2009): 864-894.
15. C.A. O'Reilly, and M.L. Tushman, "Ambidexterity as a Dynamic Capability: Resolving the Innovator's Dilemma," *Research on Organizational Behavior*, 28 (2008): 185.
16. Teece (2014) op. cit., p. 23.
17. See, for example, R.K. Yin, *Case Study Research: Design and Methods* (Thousand Oaks, CA: Sage, 2008).
18. See K. Eisenhardt, "Building Theory from Case Study Research," *Academy of Management Review*, 14/4 (October 1989): 532-550, as well as K. Eisenhardt and M.E. Graebner, "Theory Building from Cases: Opportunities and Challenges," *Academy of Management Journal*, 50/1 (February 2007): 25-32.
19. See A.C. Edmondson and S.E. McManus, "Methodological Fit in Management Field Research," *Academy of Management Review*, 32/4 (October 2007): 1155-1179.
20. See, for example, D.C. Galunic and K.M. Eisenhardt, "Architectural Innovation and Modular Corporate Forms," *Academy of Management Journal*, 44/6 (December 2001): 1229-1249. Please note that, in some of her work, Eisenhardt also used different sampling techniques, such as cohort sampling of similar cases in the same industry and economic conditions to achieve generalizability (e.g., B.L. Hallen and K.M. Eisenhardt, "Catalyzing Strategies and Efficient Tie Formation: How Entrepreneurial Firms Obtain Investment Ties," *Academy of Management Journal*, 55/1 (February 2012): 35-70). Cases may thus serve two purposes: extension of theory through distinct cases that emphasize complementary aspects of a phenomenon, and/or replication of theory through independent corroboration of specific propositions (K.M. Eisenhardt, "Better Stories and Better Constructs: The Case for Rigor and Comparative Logic," *Academy of Management Review*, 16/3 (July 1991): 620-627). Given our theoretical interest, we opted for the former.
21. For definitions of exploration and exploitation, see J.G. March, "Exploration and Exploitation in Organizational Learning," *Organization Science*, 2/1 (February 1991): 71-87.

22. See M.B. Miles and A.M. Huberman, *Qualitative Data Analyses: An Expanded Sourcebook* (Thousand Oaks, CA: Sage Publications, 1994) as well as K. Locke, *Grounded Theory in Management Research* (Thousand Oaks: Sage Publications, 2001).
23. Several prior studies have used vision, culture, and people development as important dimensions that firms have to manage to enable their effective transformation. For example: M.L. Tushman and C. O'Reilly, *Winning Through Innovation* (Boston, MA: Harvard Business Press, 2002); R. Sisodia, J. Sheth, and D. Wolfe, *Firms of Endearment* (Upper Saddle River, NJ: Pearson Business, 2014); S. Ghoshal and C. Bartlett, *The Individualized Corporation* (London: Heineman, 1999).
24. S. Raisch and F. Ferlic, "Nestlé: Sustaining Growth in Mature Markets" in C.W. Hill, R.D. Ireland, and R.E. Hoskisson, eds., *Strategic Management: Competitiveness and Globalization* (London: Cengage Learning, 2008).
25. Tushman and O'Reilly (1996), op. cit. See also S. Raisch, "Balanced Structures: Designing Organizations for Profitable Growth," *Long Range Planning*, 41/5 (October 2008): 483-508.
26. R.S. Huckman and E.P. Strick, "GlaxoSmithKline: Reorganizing Drug Discovery," Harvard Business School Teaching Case #9-605-074, p. 6.
27. G.P. Pisano, "Creating an R&D Strategy," Harvard Business School Working Paper, January 2012.
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35. See Teece (2007), op. cit.; Eisenhardt and Martin (2000), op. cit.
36. I. Barreto, "Dynamic Capabilities: A Review of Past Research and an Agenda for the Future," *Journal of Management*, 36/1 (January 2010): 256-280.
37. A few studies have taken a longer time horizon. See, for example, A. Laplume and P. Dass, "Outstreaming for Ambidexterity: Evolving a Firm's Core Business from Components to Systems by Serving Internal and External Customers," *Long Range Planning*, 48/3 (June 2015): 135-150.
38. See C.C. Markides, "Business Model Innovation: What Can the Ambidexterity Literature Teach Us?" *Academy of Management Perspectives*, 27/4 (November 2013): 319.
39. Harrel et al. (2007), op. cit., p. 40.
40. See J. Birkinshaw and K. Gupta, "Clarifying the Distinctive Contribution of Ambidexterity to the Field of Organization Studies," *Academy of Management Perspectives*, 27/4 (November 2013): 287-298; O'Reilly and Tushman (2013), op. cit.
41. See A. Zimmermann, S. Raisch, and J. Birkinshaw, "How is Ambidexterity Initiated? The Emergent Charter Definition Process," *Organization Science*, 26/4 (2015): 1119-1139.