The Evolution of the Dynamic Capabilities Framework

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Abstract The chapter sketches the past, present, and potential future of the dynamic capabilities framework. This essay is more by way of a personal reflection on the progress that has been made to date and the work remaining to be done. The dynamic capabilities framework has proved fertile ground for research and there is no evidence its momentum is slowing. In addition, I see the framework having numerous potential applications, several of which I have addressed in my own writing: (1) dynamic capabilities can serve as an overarching paradigm for teaching in business schools; (2) dynamic capabilities can potentially be built into a theory of the firm; and (3) dynamic capabilities is a policy tool for industrializing economies to help them understand the difference between accumulation and assimilation. Finally, innovation, including digital transformation, corporate entrepreneurship, and organizational behavior also contribute to the theoretical soundness of the dynamic capabilities framework.

Keywords Dynamic capabilities · Evolution · New applications

1 Introduction

In 1997, my first major publication on the dynamic capabilities framework, co-authored with Gary Pisano and Amy Shuen, appeared in the Strategic Management Journal (Teece et al., 1997). The article had actually been in the works (and making the rounds) for quite a while, with a working paper version appearing in

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1990 (Teece et al., 1990) and an introductory version (Teece & Pisano, 1994) published in *Industrial and Corporate Change*.

Along with Jensen and Meckling's paper on the agency theory of the firm (Jensen & Meckling, 1976), it's one of the two most cited papers in all of economics and business. This coincidental linkage is ironic because the two articles take such divergent views of the roles of management (Teece, 2012a), which I would characterize as "managing opportunism" (agency theory) versus "harnessing and managing opportunity" (dynamic capabilities).

The 1997 article provides a concise (and widely cited) definition of dynamic capabilities. They are "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (Teece et al., 1997, p.516). Since then, I have come to understand that dynamic capabilities are vital not just for understanding competition in the presence of rapid technological change but also for addressing deep uncertainty about technological and market opportunities and changes in regulatory environments at home and abroad more generally (Teece et al., 2016).

In this chapter, I will briefly sketch the past, present, and potential future of the dynamic capabilities framework.[1] While I will touch upon some of the key literature, no attempt has been made to be comprehensive. This essay is more by way of a personal reflection on the progress that has been made to date and the work remaining to be done.

2 Origins of the Dynamic Capabilities Framework

Early in my career I found myself teaching microeconomics to MBA students at Stanford and Berkeley, including the standard microeconomics "black box" model of the firm that assumed optimized responses by firms all using the same technology and responding to a common, exogenous set of prices. Some of the business students asked why the obvious differences between firms that were of great interest to them were virtually ignored by economic theory. And they questioned whether marginal costs increased with volume, as implied by the classic upward-sloping supply curve. Inter-firm differences, and the ability of managers to choose particular strategies and unique paths, were inherent in the news stories they read and in the business cases they studied; but economists mostly ignored the disconnect between theory and practice.

Meanwhile the dominant approach to strategy, Michael Porter's (1980) Five Forces model, was largely an application of the industrial organization branch of economics, which analyzed the sources of "the monopoly problem" but focused on a limited range of the elements of firm-level advantage. In particular, the origins of Five Forces in the industry-level analytics of the Mason-Bain industrial economics

[1] See Augier and Teece (2008) for a related discussion of how the framework relates to other theories of firm behavior and strategy.

traditions of the 1930s–1950s meant that it ignored most of what makes particular firms unique.[2] As a result, the approach urged managers to focus on positioning the firm favorably (generally by limiting competition) with regard to its customers, suppliers, and existing or potential competitors. While Five Forces analysis remains relevant in terms of assessing a firm's place in an industry, it provided managers little guidance with respect to what resources they needed to compete or how they stood with regard to complementors (i.e., partner firms) in alliances and ecosystems. It also tended to assume that complex tactics (e.g., aggressive pricing strategies) are the way to limit competition. The use of innovation as a driver to build firm-level distinct assets was basically ignored, leading managers to focus on limiting competition rather than on sharpening it through innovation-enabled disruption (i.e., Schumpeterian competition).

It was clear to me early on that successful firms derived their advantage from the capabilities that they could bring to bear (Teece, 1980, 1982). This was in keeping with the Resource-Based View (RBV) of the firm that was emerging around that time and which built on Penrose (1959), Rubin (1973), and others. The RBV emerged in the 1980s, when a number of strategic-management scholars, including Rumelt (1984), Wernerfelt (1984), and Barney (1986), began theorizing that a firm earns rents from leveraging its unique resources, which are difficult to monetize directly through contracting arrangements that would allow other firms to utilize the resources in exchange for service fees.

However, the resource approach offered little or no explanation of how firms develop or acquire new resources and manage them over time. The long-term viability of a firm requires not just the amassing of a war chest and clever strategic positioning but also a continuous learning process, periodic pruning, and ongoing orchestration of intangible assets and other resources. For the health of the enterprise, the (strategic) management of resources is at least as important as their mere possession. In the view of economist W. Brian Arthur (2009), the technologies that dominate much of the economy are no longer single-purpose machines but flexible functionalities that can brought together first in one way then later reconfigured into new combinations. Strong capabilities to create and capture value in this way are needed if an organization is to develop a sustainable competitive advantage with regard to its existing and potential rivals.

The RBV took a static view of competitive advantage; the advantage was implicitly obtained by amassing the right resources (e.g., Peteraf, 1993). The right resources are VRIN: valuable, rare, inimitable and non-substitutable (Barney, 1991). However, these attributes are all very context-dependent, and contexts change. Firms

[2] Edward Mason at Harvard during the 1930s and Joe Bain at Berkeley during the 1950s were key developers of the structuralist paradigm (sometimes referred to as structure-conduct-performance). In this view, the performance of firms in particular industries or markets depends on the conduct of buyers and sellers in matters such as pricing practices, advertising, investment, etc. Conduct, in turn, depends on the structure of the relevant market, as determined by features such as the ratio of fixed to variable costs associated with the industry's technology, the number and size distribution of buyers and sellers, and the existence of barriers blocking the entry of new firms into the industry.

have increasingly had to shift from a focus on "steady-state operations to constant adaptation" (Arthur, 2009, p.210).

Furthermore, Penrose (1959) noted that, whereas the term "resources" refers to an asset that has a fixed state once it has been brought into existence, the term "capabilities" suggests an activity that can be done badly or well and which can improve or deteriorate over time. This allows capabilities to be weak or strong and to be modified, which leads to some obvious questions: Which capabilities should firms create? How should they be created? And when should they be created? These questions need to be asked at the individual firm level, as particular (firm-level) histories and contexts will impact the answer.

In order to capture the richness of actual competition, and the particularities of time and "place," one needs to sacrifice the transparency and testability of overly parsimonious theories like the RBV. A framework, as opposed to a theory, can encompass many variables with complex interactions. Frameworks "identify the relevant variables and the questions which the user must answer" (Porter, 1991, p. 98). Or, as economist Elinor Ostrom put it in her Nobel Prize lecture: "a framework contains "the most general set of variables that an institutional analyst may want to use to examine a diversity of institutional settings including human interactions within markets, private firms, families, community organizations, legislatures, and government agencies. It provides a metatheoretical language to enable scholars to discuss any particular theory or to compare theories. A specific theory is used by an analyst to specify which working parts of a framework are considered useful to explain diverse outcomes and how they relate to one another" (Ostrom, 2010).

The initial dynamic capabilities article (Teece et al., 1997) organized the framework around processes, positions, and paths. This had the advantage of making the newer elements of knowledge and learning (processes) equivalent in importance to assets and resources (positions). The additional emphasis on the challenges of, and possibilities for, firms transforming themselves and their fortunes placed the emergent framework in an explicitly evolutionary and dynamic context (Nelson & Winter, 1982).

A decade later (Teece, 2007), I restated the framework for applied purposes not using the past (positions), present (processes), and future (paths) for structure. Instead, for practical purposes, I proposed three major clusters of high-level capabilities: sensing, seizing, and transforming. These are the key activities for organizations and management if they are to identify where markets and technology are heading, devise a means to benefit from it, and refashion the organization as necessary to realize the vision.

Additional refinements that I've added to the framework include clarifying the need for both organizational routines and entrepreneurial action by individual managers (Teece, 2012b); the division between dynamic capabilities (inherent in the organization and its personnel) and strategy (devised and refined by management to stake out a position and fend off rivals); and the distinction between ordinary and dynamic capabilities (Teece, 2014). These will be discussed further below, after a closer look at the intellectual underpinnings of the framework.

3 The Deep Roots of the Dynamic Capabilities Framework

The intellectual origins of organizational (but not dynamic) capabilities can be traced back to at least Alfred Marshall. In his *Industry and Trade* (Marshall, 1919), he described, for example, how a good manager who inspires loyalty creates a culture that lasts beyond the manager's tenure (pp.326–327). Unfortunately, as Marshall's work was taken up by others, far more attention was given to his use of math than to his deep understanding of how firms really operate and evolve. In the 1970s, Oxford economist George Richardson introduced the term "capabilities," which he defined as the "knowledge, experience and skills" in an organization that were not reflected in the classic production function, but this never became part of a theory or framework (Richardson, 1972, p. 888).

In developing a more dynamic theory of how firms choose, create, and orchestrate capabilities, I found intellectual support from several great economists (and mentors of mine) outside the mainstream who were interested in how technology and firms evolved over time: Richard R. Nelson, Sidney G. Winter, Nathan Rosenberg, and Edwin Mansfield. Nelson and Winter incorporated the key idea of organizational routines into a theory of the capabilities (and limits) of firms. My students and energetic colleagues like Gary Pisano, Connie Helfat, Will Mitchell, Brian Silverman, Giovanni Dosi, and Richard Rumelt helped me, through their assistance and engagement, to craft a framework that brought capability theory and strategic management theory together.

The dynamic capabilities framework that eventually emerged from this work wove together intellectual strands from over 50 years of scholarship in many fields including economics, sociology, marketing, behavioral decision theory, entrepreneurship, business history, operations management, and strategic management. In this section, I list the key early scholars with reference to a representative work for each one. The dynamic capabilities framework draws on all of these.

The intellectual origins of dynamic capabilities as a framework for understanding how firms respond to waves of change can perhaps be traced to Joseph Schumpeter (1934) who observed that incumbent firms were regularly displaced by entrants offering lower prices, better quality, or desirable substitutes for existing products. But Schumpeter's main interest was in larger macroeconomic debates, and he didn't go very far toward developing a firm-level theory. Valuable insights into the mechanisms giving rise to disruptive entry were added by Kirzner's (1973) work on entrepreneurialism. My own work on Profiting From Innovation (Teece, 1986, 2006) provided a model of the firm-level factors determining whether an incumbent or an entrant was likely to succeed in the market with a new technology. I subsequently came to realize that Alfred Marshall, Frank Knight, and even John Maynard Keynes had skated near the same subject with their consideration of the managerial and investment implications of deep uncertainty, although they didn't necessarily focus on innovation as the driver of that uncertainty.

Another source of the framework is scholarship that looked at the internal workings of the enterprise with regard to competitive behavior. Edith Penrose

(1959) introduced the notion of fungible resources, including managerial services, as the key source of the growth of firms. Business historian Alfred Chandler, Jr., (1977) produced detailed studies of how the management teams of specific firms built business empires in the golden age of managerial capitalism. Related theoretical insights were provided by March and Simon (1958), whose pioneering work on organizational behavior described, among other topics, how managers search for solutions to problems and reach decisions in the face of uncertainty. The cognitive biases that afflict individual decision makers in the face of risk and uncertainty were explored by Kahneman and Tversky (1979).

The field of strategic management, as such, only started to emerge in the 1970s, when leading business schools began to appoint professors of "business policy" (Rumelt et al., 1994). Scholars who have made contributions that I've found particularly helpful include Richard Rumelt, for his work on isolating mechanisms (Rumelt, 1984), and Oliver Williamson (1975), who pointed out the importance of asset specificity for determining bargaining power in market-based relationships. Concepts such as these are central to understanding how managers determine the most promising configuration of assets inside and outside the firm.

Although strategy formation is encompassed in the dynamic capabilities framework, I don't see it as a direct function of dynamic capabilities (Teece, 2014). Technology and innovation are more central to capabilities. Strategy and capabilities are connected, if not codetermined.

I've also been influenced by numerous innovation scholars, such as Giovanni Dosi (1982) for his work on technological trajectories and Michael Tushman for his concept of competence-enhancing and competence-destroying innovation (Tushman & Anderson, 1986). Nathan Rosenberg (1982) highlighted the innovative power of technological complementarity, while W. Brian Arthur (1988) analyzed the sources of increasing returns, which are changing how industries evolve.

Each of these sources, and many others, was influential in the early development of the dynamic capabilities framework. The framework is not intended to supersede them but rather to provide an envelope within which they all fit together and within which their interactions can be understood.

4 The Dynamic Capabilities Framework

We now come to the framework itself, which I will summarize only briefly here. Longer descriptions can be found in my earlier articles, particularly Teece (2007) and Teece (2014). The framework will undoubtedly continue to evolve as less-explored aspects of it are more fully elaborated and integrated.

A capability is a set of learned processes and activities that enable an organization to produce a particular outcome. The types of capabilities that business schools have historically taught discount innovation in favor of greater efficiency. The capabilities needed for efficient operation are what I call "ordinary capabilities." Even the strongest ordinary capabilities can typically be learned from university courses,

consultants, or targeted hires. The diffusion of an improved process across an industry can be relatively rapid, although with more complex systems it can take decades, as in the case of the Toyota System of Production in the auto industry. Today, digitization is enabling a new kind of ordinary capabilities that are less dependent on traditional operating constraints (Iansiti & Lakhani, 2020). Digital systems are easier to scale and transform, providing rivals a moving target. For the many companies that remain dependent on more traditional labor and physical capital, though, ordinary capabilities are not in themselves a basis for more than transitory competitive advantage and can often be outsourced, at least where there is strong competition and a proper legal framework enabling markets to function.

In sharp contrast, dynamic capabilities are forward-looking. Instead of governing what the firm is currently doing, they involve deciding what the firm should be doing in the future, ensuring access to the resources the firm will need, and implementing the organizational design that will be best suited. I summarize the multiple activities involved as sensing, seizing, and transforming. Each of these categories of capabilities has many separate elements.

These elements, taken in isolation, are what I call microfoundations, or low-level dynamic capabilities (Teece, 2007, 2018). They include narrow-purpose processes such as forming external partnerships, or developing new products. They are strategic and transformative, like dynamic capabilities, but they are, for the most part, repetitive and imitable, like ordinary capabilities.

Whereas ordinary capabilities can usually be upgraded and tuned by accessing public knowledge or licensed proprietary knowledge, high-level dynamic capabilities (i.e., sensing, seizing, and transforming) are more idiosyncratic. They must be built because they cannot be bought. This is partly because they involve managerial cognition (Adner & Helfat, 2003) and learning. They can be partially embedded in organizational routines that are rooted in the company's culture and history. Companies with strong dynamic capabilities also tend to have their own, unique "signature processes" (Gratton & Ghoshal, 2005). The history-bound (and often tacit) nature of these processes makes them difficult for rivals to imitate. Provided that management doesn't allow the advantages of this history to stagnate and become maladapted as the business environment changes, signature processes can provide a foundation for competitive advantage. While outside experts can provide certain elements of dynamic capabilities, such as identifying trends, most elements of dynamic capabilities cannot (and should not) be outsourced.

For dynamic capabilities to be strong, management must be entrepreneurial (Teece, 2016). This means that managers need to be involved in developing and testing conjectures about emerging technological and marketplace trends, devising and refining new business models, and orchestrating the necessary assets inside and outside the organization. And this forward-looking, entrepreneurial approach must be infused throughout the enterprise.

Boards of directors must be capable and ready to engage constructively in matters of strategy. They can play a role in ensuring that managers are thinking far enough

ahead while maintaining the resiliency to face the "black swans" characteristic of business environments fraught with deep uncertainty (Teece et al., 2016).

Strong leadership is also required, especially when difficult organizational changes are implemented, or when corporate culture is being revamped. Leadership is particularly needed to propagate a vision and achieve unity of purpose.

As mentioned earlier, strategy is not a direct outcome of dynamic capabilities. The exercise of a firm's dynamic capabilities must be coupled with effective strategizing to bring about competitive advantage.

5 Dynamic Capabilities Applied: Digital Transformation

The dynamic capabilities framework is built around concepts of sufficient generality that they can be readily applied in any organizational setting. At the same time, it incorporates sets of microfoundations that can be adopted by practitioners as well as by researchers to address specific situations.

Digital transformation, a relatively recent phenomenon, is a case in point. It is only in the past 10 years, when the combination of 4G wireless communications and powerful smartphones were widely diffused, that networks have become truly pervasive. Now that most humans are connected to a common digital network, the digital transformation of existing business models and processes is an imperative for companies to remain competitive and create new advantages (Fitzgerald et al., 2013). A growing number of empirical studies are adopting dynamic capabilities to frame their analyses of digital transformation across a range of industries, from agribusiness to publishing (Cannas, 2021; Chirumalla, 2021; Ellström et al., 2021; Jantunen et al., 2018; Soluk & Kammerlander, 2021; Warner & Wäger, 2019; Witschel et al., 2019).

Digital transformation often involves the launching of one or more platforms, i.e., digital hubs for an ecosystem that may include suppliers, customers, or complementors. Ecosystems have lives of their own, and, just like a single organization, must adapt to changes in their environment (Teece, 2017).

There are two basic types of digital platform, with numerous hybrid combinations (Evans & Gawer, 2016). A *transaction platform*, such as Amazon Marketplace, facilitates exchanges by otherwise fragmented groups of consumers and/or firms. An *innovation platform*, such as Apple's iOS, provides a base technology (e.g., the iPhone) and distribution system (e.g., servers) to which other companies can add their own innovations through the App Store (a transaction platform), increasing the value for the ecosystem as a whole.

Platform leaders take responsibility for guiding the ongoing technological evolution of the system and setting the rules for ecosystem participation (Gawer & Cusumano, 2002). Platforms often compete against each other (e.g., Apple versus Windows), so an ability to attract and retain the most valuable complementors as ecosystem partners is crucial (Van Alstyne et al., 2016).

One of the fundamental tasks in digital transformation, whether platform-based or not, is devising and implementing a new business model (Verhoef et al., 2021). A business model encompasses the complete architecture of the value creation, delivery, and capture mechanisms for a business (Teece, 2010). Here I will provide a schematic overview of how the capabilities framework applies, including a small selection of microfoundational activities.

The process of designing a new business model typically begins by sensing the opportunities in new (or not yet adopted) technologies and how they might address unmet (or poorly met) needs of new or existing customers. The value potential of each opportunity must be calibrated, the likely competitive landscape(s) surveyed, and one or more options to pursue chosen. Digital technologies enhance the ability to rapidly test and adjust hypotheses about consumers and/or technologies, which is particularly important for "generative sensing" (Dong et al., 2016).

A firm's seizing capabilities govern the crafting of a revenue mechanism. To be sustainable, a business model must provide a customer solution that can support a price high enough to cover all costs and yield profit that is at least sufficient to support the business and its growth. This may not, however, be the case initially. If the new business must first build up a user base to generate sufficiently large network effects, it may still be warranted to offer a product in the absence of initial profitability.

Seizing also encompasses planning the organization's value chain, including the designation of which activities will be internalized and which will be left to outside suppliers. A key microfoundation is the identification of potential "bottleneck" assets that are both scarce and indispensable, which makes them able to demand profit-draining rents if not owned by the focal company (Teece, 1986, 2006). This analysis must also extend to intellectual property, including patents. Just as a key input can be a bottleneck asset, so can a necessary trade secret or a strong patent owned by a rival; the business model ought to include the ability to secure rights to such assets at a sustainable cost (Somaya et al., 2011).

The implementation of the new business model and its associated strategy calls on the firm's transformation capabilities. Capability gaps must be identified and filled through internal development, acquisition, or alliance. The analysis of existing capabilities in terms of their suitability needs an objective point of view to avoid organizational pride exaggerating management's beliefs about the fitness of the organization.

The speed of implementation also matters. Being first to market with a new business model is particularly important when it involves a platform that will benefit from network effects. Establishing a large installed base can serve as a potential barrier to entry (Staykova & Damsgaard, 2015).

New capabilities typically mean the introduction of new people. Time must be allowed for newly (re)constituted teams to develop their routines and working relationships.

All the necessary elements must be reconfigured and orchestrated. Part of this task is ensuring the alignment of the organization's structures with strategy. New activities require sufficient resources and independence to thrive. Yet overall organizational coherence must also be maintained (Teece, 2019a).

This of course is a linear and highly stylized depiction of a few of the microfoundations for what is, in reality, a complex, painstaking, and iterative process. As indicated above, there are many studies diving deep into the application of dynamic capabilities to the digital transformation of specific firms.

6 The Divisions Within the Dynamic Capabilities Literature

The framework described and applied in the previous sections is how I've conceived dynamic capabilities. However, in the two decades since its original appearance, numerous other descriptions have been written, some of which miss key aspects.

A bibliometric study by Peteraf et al. (2013) identified two main strands in the dynamic capabilities literature. The framework proposed by Teece et al. (1997) argued for the relevance of dynamic capabilities to the creation of sustainable competitive advantage even in a business environment of rapid change. A much narrower vision proposed by Eisenhardt and Martin (2000) has found currency in the organizational behavior literature. Examples of each are shown in Table 1, beginning with the initial statements about routines and capabilities by Teece, Pisano, and Shuen. The Eisenhardt and Martin definition, which more or less corresponds to microfoundations, is joined by Winter's (2003) entirely routine-based definition, which has also been influential. These are contrasted with my later definitions of the different types of capabilities.

For Eisenhardt and Martin (2000), Winter (2003), and those who embrace similar views, dynamic capabilities consist solely of repeatable routines governed by "simple rules" (Bingham et al., 2007). Defined this way, they are unstable, especially in a rapidly changing environment, and subject to imitation by rivals, at least in their effects.

By limiting their definition of dynamic capabilities to the narrow-purpose activities I call microfoundations, Eisenhardt and Martin ignored the critical higher-level capabilities in which strategic, non-routine managerial decisions play a larger role, represented by the right-most column of Fig. 1.

In my own writing (e.g., Augier & Teece, 2009; Teece, 2007, 2012b), I have made clear that dynamic capabilities involve a combination of organizational routines and entrepreneurial management. Many of the key managerial decisions in a company's history depend not, in the first instance, on technical analysis and decision rules but rather on creative insight and intuition. As discussed above, the ability of managers to conceive of new combinations is increasingly a key factor in sustaining competitiveness, and no framework for competitive advantage can be complete without including this managerial skill in some form. The sensing and seizing activities in the dynamic capabilities framework flow (or not) from this fundamental, non-routine managerial ability (or lack of it).

Table 1 Leading Definitions of Three Levels in the Dynamic Capabilities Framework

	Teece et al. (1990, 1997)	Eisenhardt & Martin (2000)	Winter (2003)	Teece (2007–2018)
Dynamic capabilities definition	"Dynamic capabilities"—The firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments (Teece et al., 1997, p.516)		"Higher order"—Investments in organizational learning to facilitate the creation and modification of dynamic capabilities for the management of acquisitions or alliances (Winter, 2003, p.994)	"Dynamic capabilities"—Strong dynamic capabilities help enable an enterprise to profitably build and renew resources and assets that lie both within and beyond its boundaries, reconfiguring them as needed to innovate and respond to (or bring about) changes in the market and business environment (Teece, 2014, p.332)
The role of routines	"Dynamic routines" – "Directed at learning and new product-process development" (Teece et al., 1990, p. 12)	"Dynamic capabilities"—organizational and strategic routines by which managers acquire and shed resources, integrate them together, and recombine them to generate new value-creating strategies to match and even create market change. Examples: Product development, TMT decision making, replication, resource allocation, coevolving, patching, knowledge creation, alliance formation, M & A (pp.1107–8)	"first order"—A "dynamic capability" enables a firm to alter how it currently makes its living. Examples: new product development or the opening of new outlets. The definition implies "reliable patterned behavior" (Helfat & Winter, 2011, pp.1244–5)	"Low-level DCs" or "microfoundations"—Processes for forming external partnerships or for developing new products. They consist of (often idiosyncratic) routines that are employed less often than the routines of ordinary capabilities (2018, p. 364). [microfoundations are the "distinct skills, processes, procedures, organizational structures, decision rules, and disciplines that undergird sensing, seizing, and transforming (Teece, 2007 abstract)]
Ordinary capabilities definition	"Static routines"—"Static routines embody the capacity to replicate certain		"Zero order" or "zero level"—the "how we earn a living now"	"Ordinary capabilities"—administrative, operational, and governance-related functions that are

(continued)

Table 1 (continued)

	Teece et al. (1990, 1997)	Eisenhardt & Martin (2000)	Winter (2003)	Teece (2007–2018)
	previously performed tasks (Teece et al., 1990, p.12)		capabilities: producing and selling the same product, on the same scale and to the same customer population (Winter, 2003, p.992)	necessary to the execution of current plans (Teece, 2016, p.204)

Note: definitions slightly edited from original sources

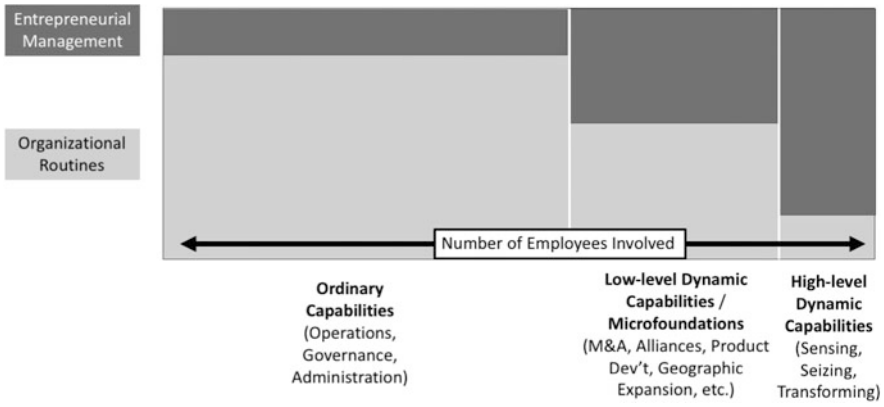

Fig. 1 Capabilities, routines, and managerial decisions. Note: Horizontal width reflects the quantity of organizational resources committed to each category of capability

Viewed this way, dynamic capabilities need not be stable (in the sense of something fixed once for all time) to be strong. They can shift as new managers bring fresh insights to mesh with the slower-changing high-level routines and culture of a given organization.

This ability to steer dynamic capabilities in new directions, despite their need to flow with the relatively deep currents within an organization, is also a major reason that they are not reducible to best practices that can be imitated or approximated.

To some extent, the split in the literature has to do with the disciplinary focus of the scholars involved (Peteraf et al., 2013). While those following the more prescriptive and entrepreneurial path laid out by Teece et al. (1997) tend to have a background in the study of industry-level subjects such as economics and technology, those who take the less expansive approach associated with Eisenhardt and Martin (2000) tend to be focused on organizational behavior or information systems. In other words, the narrow, routines-only approach is most likely to be adopted by

those interested more in internal processes than in industry dynamics. The bifurcation of the literature is thus a manifestation of the well-recognized but persistent problem that business schools are divided into disciplinary silos that privilege different levels of analysis (Teece, 2011).

Although the damage is done and confusion persists, there has been some convergence toward a common definition. Winter, for example, has acknowledged that differences now come down to the balance between routines and decision making (Winter, 2017, p.73). Bingham and Eisenhardt (2011) have recognized that higher dynamic capabilities governed the addition and subtraction of the simple rules that guide the processes they previously identified as dynamic capabilities. However, they still treat intuitive, entrepreneurial decision making as separate "improvisation" (Bingham, 2009).

Convergence around a unified definition of dynamic capabilities may be slow, but the ongoing process has been fruitful, generating, among other things, numerous literature reviews attempting a synthesis of the field. Slowly but surely such efforts bring the dynamic capabilities construct closer to its ultimate promise of unifying the diverse strands of management research in a single theory of how firms build competitive advantage.

7 The Future of the Dynamic Capabilities Framework

The dynamic capabilities framework has proved fertile ground for research, and there is no evidence its momentum is slowing. In addition to the goal of eventually healing the split in the way different scholars define dynamic capabilities, I see the framework having numerous potential applications, several of which I have addressed in my own writing.

One of these is for dynamic capabilities to serve as an overarching paradigm for teaching in business schools (Teece, 2011). As set out earlier, the framework was designed as a portmanteau of earlier theories and multiple disciplines, making it an excellent guide to how the disparate threads of a modern business education come together in the business enterprise. It is what I have referred to as a "workable systems theory" (Teece, 2018).

For economic theory, dynamic capabilities can potentially be built into a theory of the firm (Teece, 2019b). In addition to deepening the economics of why firms exist and the distinctive role of the manager (Augier & Teece, 2008), the framework has the potential to introduce much that is currently absent, including interfirm heterogeneity and a model of how individual firms compete. It is a framework that recognizes complex interactions within a firm, with other firms, and with the business environment in a quest to understand long-run enterprise performance. In that sense, it might be thought of as the strategic management application of the general systems theory that emerged in the 1950s (Teece, 2018). Similarly, it is a practical application of the abstract "complexity economics" that has developed in parallel with dynamic capabilities to build models of the economy that include

heterogeneous agents "responding to ill-defined situations by 'making sense' ... and choosing their actions, strategies or forecasts accordingly (Arthur, 2021, p.138).

Another application is as a policy tool for industrializing economies to help them understand the difference between accumulation and assimilation (Nelson & Pack, 1999). Governments often measure the success of the enterprises operating in their territory in terms of their accumulation of assets. The danger of this is that such governments might then fail to support the innovative and entrepreneurial activities at which firms must excel in order to compete effectively.

The framework can also serve as a guide to empirical research. Although it is a framework rather than a disprovable theory, detailed case studies (e.g., Danneels, 2011; Tripsas & Gavetti, 2000) have provided confirmative evidence. Because it is an envelope for many of the management concepts that are constantly being examined, empirical results in areas such as innovation, corporate entrepreneurship, and organizational behavior also contribute to the theoretical soundness of the dynamic capabilities framework.

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