

Dynamic Capabilities and Routine Dynamics

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ABSTRACT

In the strategic management tradition, dynamic capabilities are interpreted as grounded in high-level routines, while in the routine dynamics framework routines are seen as inherently dynamic. Despite the apparent convergence of constructs and interests, these two approaches to understanding routines and the dynamism that they embody and engender have not been building on each other. In this chapter I analyze commonalities and differences between the two views in relation to their ontologies, their focal interests, and their levels of theory, measurement and analysis. I also describe how the two views contribute—although from different angles—to answering the same questions on routines emergence and change, on their role in inhibiting and promoting creativity and novelty, and in maintaining pattern and variety. Finally, I provide directions for future research on routine participants, ecologies of routines, and routines performance, which build on both views, without necessarily integrating them.

1. Introduction.

Explaining how business organizations and their participants address the dynamics of the context in which they operate has been a major focus of recent theorizing in both strategic management and organizational theory. Although concepts and labels coined to understand the phenomenon abound, two of them stand out for the rising attention they attracted and for

some striking similarities in their focus—routine dynamics (RD) and dynamic capabilities (DC). DC scholars investigate how high-level routines, or collections of routines, allow firms to dynamically adapt their resource endowments to shifting competitive conditions (Brown and Eisenhardt, 2000; Teece, Pisano and Shuen, 1997; Zollo and Winter, 2002). The high-level (or second-order, search, dynamic) routines in which DC are grounded are considered as stable entities that senior managers intentionally create, shape, and implement (Helfat et al., 2007) to reliably and systematically alter lower-level (or operational, ordinary, substantive) routines. Scholars in the fast-growing RD field investigate how actors perform organizational routines of any kind. Focus is on the specific actions performed by multiple actors at specific times and places, and on how recognizable, repetitive patterns of interdependent action emerge and change (INTRODUCTION, in this book; Feldman and Pentland, 2003; Feldman, Pentland, D’Adderio and Lazaric, 2016; Pentland, Feldman, Becker and Liu, 2012). Therefore, scholars in both traditions share an interest in routines and in how they, somewhat counterintuitively, engender forms of dynamism.

However, a few sharp differences in how scholars developed DC and RD concepts prevented them from overtly exploring and exploiting the manifest connections between the two fields. Research in DC has tended to happen at the organizational level, understanding DC as collective entities that are intentionally created and maintained by top managers, with limited attention to their internal dynamics (Ambrosini and Bowman, 2009; Ambrosini, Bowman and Collier, 2009; Barreto, 2010). Moreover, focus has been on how DC affect firm-level market and financial performance, rather than on organizational participants performing DC. In contrast, the RD framework **has taken individual actions as the unit of observation**, with limited attention to how top managers can shape and direct how participants perform routines. Moreover, focus has been **on actors performing routines, rather than on the effects of participants’ actions on task performance** (Deken and Sele, 2020, *in this book*). These

differences prevented the DC field to benefit from understanding the possible effects of routine enactments on firm performance, and the RD field to integrate knowledge of how intentional top management intervention enables and constraints how actors perform routines and how effectively a routine task is performed.

The purpose of this chapter is to suggest how the walls that currently separate the two fields can be turned into bridges and how researchers in each camp can walk across those bridges to develop novel and mutually beneficial insights. I will argue that RD may enhance what we know about the sources of dynamism, flexibility, and heterogeneity in DC and, thus, how DC can contribute to building and sustaining competitive advantage. From the other side of the bridge, the DC view may expand the understanding of RD by including the role of intentional managerial interventions in shaping the organizational context in which participants enact routines, but also in directly shaping routine patterning. Moreover, RD researchers may be prompted by the DC view to more systematically turn their attention towards how RD affect task performance and, eventually, firm competitive and financial performance. In this chapter I will first dig deeper in the similarities and differences between DC and RD, mapping boundaries and connections. Next, I will illustrate how combining insights from the two fields may enhance our understanding of four key questions raised by the dynamics of organizational routines. Finally, I will offer directions for future research grounded in the opportunities for mutual learning across the two fields.

2. Routine dynamics and dynamic capabilities: Opposition and cooperation.

When observed from a distance, *routine dynamics* and *dynamic capabilities* are apparently overlapping approaches. If we assume that an organizational capability is, or is grounded in, a high-level routine or collection of routines (Winter, 2000), the two entities are, at least

semantically, very similar. Zooming-in on the two concepts and related literatures, profound differences emerge. The two main distinctions refer to ontology and level issues (Table 1).

--- Table 1 about here ---

These deep-seated differences, however, do not prevent potential cooperation across the two views.

2.1. Different ontologies.

The first main difference between the two views is ontological. DC theory is grounded on the classic view of routines, which rests on a positivist ontology and behavioral or evolutionary theoretical perspectives (Sydow, 2020, *in this book*; Schilke, Hu and Helfat, 2018). DC are entities that objectively exist out there, and can thus be intentionally created, adapted, and exploited to produce desired outcomes. In his classic definition, Winter (2000) describes a capability as a routine that “together with its implementing input flows, confers upon an organization’s management a set of decision options for producing significant outputs of a particular type” (p.981). Similarly, Zahra, Sapienza and Davidsson (2006) explicitly mention the role of managers in driving the emergence and use of DC: “The creation and subsequent use of dynamic capabilities correspond to the entrepreneur, the entrepreneurial team, or the firm’s senior management’s perception of opportunities to productively change existing routines or resource configurations, their willingness to undertake such change, and their ability to implement these changes. This ability is largely determined by the motivation, skills and experiences of the firm’s key managers” (p.918).

In contrast to this positivistic approach, the RD view is grounded on a social-constructivist ontology and pragmatist and structuration theoretical perspectives (Sydow, 2020, *in this book*). Routines are not objective entities that can be intentionally molded by actors external to them. They are effortful accomplishments of their individual participants, and they are only stable-for-now. Subsequent enactments steer them in often unanticipated

directions, thus altering how participants—and close-enough external observers—view and experience them (Introduction, *in this book*; Feldman and Pentland, 2003; Feldman et al., 2016).

2.2. Different levels.

The second main distinction between DC and RD views refers to the different levels at which they investigate the same or similar empirical phenomena. Different theoretical views may have the same level of theory but different levels of measurement and analysis (Klein, Dansereau and Hall, 1994). The *level of theory* (also referred to as *unit of analysis*) describes the target (e.g., individual, routine, organization) that a theorist or researcher aims to describe, understand, and explain. It is “the level to which generalizations are made” (Rousseau, 1985: 4). The *level of measurement* describes the actual source of the data—“the unit to which data are directly attached” (Rousseau, 1985: 4). For instance, a product-development routine (level of theory or unit of analysis) can be described by either collecting information (level of measurement) on the specific actions performed by individual routine participants, or by collecting information on the routine as a whole, such as money invested, team size, number of products developed, time-to-market performance over time. The *level of analysis* describes the treatment of the data during data analysis procedures (Klein, Dansereau and Hall, 1994). For instance, data collected at the individual level may be treated still at the individual level (“John did this ... Edith did that”), or aggregated at the routine level (“overall, routine participants did that”).

RD and DC scholars would probably agree that they share an interest in the routine as the level of theory (or unit of analysis). As a matter of fact, RD scholars are interested in exploring “the idea that routines are practices with internal dynamics (Feldman and Pentland, 2003)” (Feldman et al., 2016: 505). This demonstrates that, in the RD field, detailed and longitudinal analysis of routine participants’ actions is not an end in itself, but is directed at

learning more about how participants enact routines. DC scholars' focus on routines is probably even more explicit. They are interested in exploring how the high-level routines constitutive of DC are “directed to the development and adaptation of operating routines” (Zollo and Winter, 2002: 339) and, eventually, to the improvement of firm performance and competitive advantage (Teece and Pisano, 1994; Teece et al., 1997).

This shared interest of the RD and DC views on routines as the level of theory, however, is practiced from radically different perspectives. Not surprisingly, ontological differences determine epistemological differences—how routines are known and investigated by scholars in each camp. To RD scholars, the routine has traditionally been the highest, or more macro, level of theory. They are interested in what happens at lower levels or within the routine. Their focus is on the dynamics that happen within the routine. The level of measurement and analysis are thus the actions performed by individual routine participants at specific times and places, with the aim of understanding how these actions dynamically shape routine patterning and how actors perform the routine over time and over multiple enactments.

In contrast, to DC scholars the routine is the *lowest*, or more micro, level of theory. They are interested in what happens *outside* the routine. Their focus is on the dynamics that routines engender outside, in other organizational entities. The level of measurement and analysis is thus the high-level routine (or collection of routines) itself—in which the dynamic capability as a whole is grounded—with the aim of understanding how it can be intentionally created and shaped by senior managers, and how the DC can adapt operating routines and bundles of resources, i.e., make them more dynamic, and thus potentially improving firm-level performance. This core difference can also be explained by suggesting that RD focus is mainly on *variation* (the actions of individual routine participants are aimed at reproducing the same pattern—or *effortful accomplishment*), while DC focus is mainly on *change* (routine

enactments are aimed at producing new or different patterns—*emergent accomplishment*; Cohen, 2007; Feldman et al., 2016).

2.3. Potential cooperation.

The aim of this chapter is not to propose a combination of the RD and DC views. It is entirely legitimate that scholars from different traditions and worldviews investigate the same entity from different perspectives and with different methods and purposes. Moreover, ontological differences are so deep-seated that a combination is likely unfeasible (Parmigiani and Howard-Grenville, 2011). However, the insights developed from empirical analysis in each tradition may be mutually beneficial, driving future research in novel and fruitful—although separate—directions. An example is Deken and Sele's (2020, *in this book*) framework for interpreting innovation work with a routine dynamics lens. An empirical application is offered by Salvato (2009), who applied a DC approach to studying how a design firm's product development routine evolved over time as a result of improvisations performed by specific routine participants at specific times and places, but also as a result of senior manager's involvement in formalizing and replicating those improvisations. The adapted routine resulting from both participants' improvisation and top management intervention improved product development outcomes and, eventually, firm performance. In this example, a DC approach allows to see how senior managers' interventions frame and substantially alter routine patterns and how routines are performed by their participants. These effects, and their impact on task and firm performance, would otherwise go unnoticed.

In a separate study on the same design firm, Salvato and Rerup (2018) applied a RD approach to studying how improvisations of product development routine participants gradually reshaped routine patterns (with little or no intervention of senior managers), and how these endogenous changes allowed routine enactments to effectively address changes in the firm's competitive environment. In this example, a RD approach demonstrates that

routines are sometimes made dynamic by their participants, without any intervention of senior managers on the routine as an entity. Managerial interventions may actually disrupt the effectiveness of ongoing changes from within, lacking detailed understanding of internal routine dynamics (Salvato and Rerup, 2011).

Cooperation across the two views should result from their shared interest in routines as the level of theory. This interest is obvious in the RD view. However, the concept of DC is also inherently grounded in organizational routines. An overview of the main definitions shows that not only DC are explicitly grounded in routines, or they even are routines, but also that their conceptualizations may provide several insights to the field of RD (Table 2).

--- TABLE 2 ABOUT HERE ---

Additional insights on how the two fields may cooperate result from reading the empirical results of research in one camp with the conceptual lenses adopted in the other. While DC empirical research has been both quantitative and qualitative, RD studies have been almost exclusively grounded in qualitative research. Therefore, in this chapter I only contrast field studies carried out in the two traditions, disregarding large-n studied in DC and RD.

An analysis of some of the most influential field studies in DC (Table 3) shows that research in this tradition addresses the three core observations that are basic to the RD lens (Feldman et al., 2016): actions are situated; actors are knowledgeable and often reflective; the routine that appears to be stable is only stable-for-now and its stability is an ongoing accomplishment of its participants. The analysis of these DC field studies from a RD perspective thus reveals several potential implications that could be derived from closer collaboration between the two perspectives.

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In a similar vein, an analysis of some of the most influential field studies in RD (Table 4) shows that research in this tradition addresses the three building blocks of the dynamic

capabilities lens (Feldman et al., 2016): routines or collections of routines determine a capability, which is a firm-level ability to perform a task; enactments of some “higher-level” routines result in building, integrating, reconfiguring, releasing resource configurations; this determines economically-significant change and effects on a firm’s competitive advantage. Therefore, the analysis of these RD field studies from a DC perspective unveils several potential implications that could be derived from closer collaboration between the two views.

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Drawing on insights from Tables 3 and 4, in the next section I will illustrate how the two views jointly contribute to the main four questions in the RD field (Feldman et al., 2016): (1) *How do routines emerge and change?* (2) *How do collections of interacting routines inhibit and promote stability and change?* (3) *How do routines inhibit and promote creativity and novelty?* (4) *How do routines help organizations maintain both pattern and variety?* In turn, these mutual contributions raise interesting avenues for future research, that will be further expanded in the last section.

3. DC and RD jointly contribute to answering the same research questions.

3.1. How do routines emerge and change?

Understanding routine emergence and change may significantly benefit from connecting the insights developed in the DC and RD fields. Insights from field studies in DC suggest that intentional efforts by senior managers in codifying and transferring knowledge have a greater role in routine emergence and evolution than RD research suggests. In turn, RD research points to the fact that effective and dynamic routines may spontaneously emerge even lacking higher-level managerial intentionality and the intentional creation of an organizational context conducive of knowledge accumulation and transfer.

Insights from DC. Theoretical as well as empirical studies suggest that DC result from the accumulation of experience, and that more, similar, slowly paced, and codified experience is particularly effective in the learning of dynamic capabilities (Bingham, Heimeriks, Schijven, and Gates, 2015; Hayward, 2002; Zollo and Winter, 2002; Zollo, Reuer and Singh, 2002). Several conceptual and empirical works in the literature on organizational routines have described the spontaneous accumulation and transfer of experience that allows routines to emerge and change (Cyert and March, 1963; Nelson and Winter, 1982). Scholars in DC add an important dimension to this knowledge, which is the intentionality in designing and enacting new or improved routines by structuring learning and knowledge codification and transfer. These dimensions have been partially overlooked by the RD literature, which is less interested in top-down intentionality.

Cumulative experience from multiple enactments of a capability provides participants knowledge that helps them better understand the causal linkages between actions and outcomes. Codification of experience—the written documentation of knowledge in manuals, rule books, and blueprints—impacts the learning of routines underlying DC. In particular, codification helps distill the tacit knowledge that individual routine participants develop across multiple enactments of the routine (Zollo and Winter, 2002). In his study of the design company Alessi, for instance, Salvato (2009) showed how top managers formalized changes to the product-development routine resulting from participants' improvisation, when such changes resulted in improvements of the overall effectiveness of routine. The adapted routines were thus included in the firm's product development manual to be replicated. Tippmann et al. (2014) observed that in a leading ICT company, managers adopted a flexible organizational structure and the diffusion of knowledge which resulted in the generation of knowledge search routines. Similarly, Martin (2011) showed how top managers' alteration of groups structures and processes engendered dynamic processes connecting the general

managers of different business units in six software companies, which allowed them to adapt company strategies to their dynamic environments.

These insights have also been applied to understand how managers can develop multiple connected DC in parallel. In their field study of Dow Chemicals, Bingham et al. (2015) illustrated how executives intentionally designed a process of concurrent learning and knowledge dissemination to simultaneously develop DC for M&A, alliances, and disposals. First, managers “initiated structure,” by setting up a dedicated group to begin knowledge codification and transfer. This group started to codify knowledge from early deals and later made them more granular and systematically updated them. Second, the dedicated group also “generalized structure,” by transferring knowledge from acquisition processes to joint ventures and divestitures and by strengthening communication between the cross-functional teams performing each deal.

Insights from RD. RD empirical research is focused more on routines change than emergence. In contrast with the DC view of dynamic routines as top-down and engineered by top managers, RD research shows that they may spontaneously emerge and change even without higher-level managerial intentionality: “Each time a routine is enacted is an occasion for variation [...] Variations may be retained (or not) for a variety of reasons, which may or may not be conscious or articulated” (Feldman et al., 2016, p. 508).

The main reason why routines tend to spontaneously emerge and change in the RD view is that their enactment is situated, which means that it happens in time, space, and in given organizational contexts. Therefore, the outcome of enactments is difficult to anticipate and “participants in a routine may not always be aware of what they are accomplishing or even that they have created a variation” (Feldman et al., 2016, p. 508). Moreover, variations may be driven by reflectivity, but they are often determined by emotions, for example when

alterations are introduced because they are more fun, more familiar, or more aesthetically pleasing.

Interestingly, however, empirical research in RD shows that very often routine participants perform changes aimed at making routines more dynamic—more effective, better fitting with connected routines, or providing more opportunities for task performance. In their study of a printing factory, for example, Aroles and McLean (2016) observed that participants enacted multiple adaptations to reduce the cost of printing and to keep the “print” quality of the copy. At CellCo—a startup company in the pharmaceutical industry—talk among participants allowed them to adapt the shipping routine by retaining the most effective adaptations that were suggested and tested as the routine was performed (Dittrich, Guérard, and Seidl, 2016). In other studies, the adaptation of routines to a dynamic environment results from a combination of top-down managerial intervention and bottom-up enactments by participants. For instance, Cohendet and Simon (2016) noticed that at Ubisoft—a videogame development office—the formation of new dynamic routines emerged by articulating new procedures through a combination of top-down directions from management, and bottom-up involvement of participants involved in the dynamic routines.

Empirical evidence and theorizing in the RD framework therefore suggest that it might even be possible for a firm to have a DC that was not intentionally designed, because the enacted patterns and the ostensive aspect of the routine may or may not be articulated by its participants or by others. A firm might thus have a DC without knowing, or without being aware of where it resides—in what actions, people, and artifacts.

3.2. How do routines, and collections of interacting routines, inhibit and promote creativity and novelty?

A second question addressed by both the DC and RD frameworks refers to the role of routines in creativity and novelty (MacLean, MacIntosh and Seidl, 2015; Pandza and Thorpe, 2009). Organizational routines are often considered antithetical to creativity because traditional views of routines tended to conflate routines and routineness (Feldman et al., 2016). The DC and RD frameworks provide avenues to explain, for example, how designers, architects and others can consistently produce novel work (Cohendet and Simon, 2016) and how top managers can organize for creativity (Salvato, 2003, 2009; Grand, 2016). However, several questions remain open, and cooperation across the two fields may help answering them.

Insights from DC. DC are grounded in organizational routines, or collections of routines. The classic view of routines (Cyert and March, 1963; Nelson and Winter, 1982) emphasized their path-dependence—the fact that structure and a reproduction regime tend to shape how routines are performed (Sydow, 2020, *in this book*). In this view, routines are characterized by structural inertia and institutional persistence, and deviating from pattern is unlikely, although possible. So far, the DC perspective has incorporated this view of routines, with only a few exceptions. As a result, it is still unclear how DC can promote creativity and novelty. DC grounded on this view of their underlying routines may certainly be capable of reliably adapting existing resources but not in a truly novel and creative way, because DC are themselves patterned and learnt from past experience (Salvato and Vassolo, 2018).

Yet DC have been used to explain how firms introduce varying degrees of novelty, including innovative and highly creative actions. What DC bring to the attempts at generating innovation and creativity in organizations is the learning and practice at performing certain tasks (Nelson and Winter, 1982). As Winter (2008: 48) suggests: “The skilled performer, drawing on years of practice, ‘makes it look easy’.” The learning and practice that grounds high-level routines may in some cases supplant individual creativity as the source of the core change dynamic, while in other cases the stable aspect provided by the routine is only a

framework to support and exploit the highly creative individuals who generate the elements of true novelty, such as in R&D departments (Helfat, 1997). In both cases, DC are conducive of innovation and creativity. In his illustration of Intel's DC in creating new semiconductor products, for example, Winter (2008) suggests that the significant novelties introduced by Intel were generated by routines that could thus not be regarded as merely repetitive behavior.

Within these high-level routines, individual problem-solvers are merely “interchangeable parts” or “requisites of the overall system performance” (Winter, 2008: 52). This view of individual actors in routines seems to prevent a connection to RD, in which individual actors are central in determining the core change dynamics. However, as Winter (2008: 53) suggests in relation to Intel's DC: “it is clear that much more than firm-level capability has been involved, and in particular that there has been a major role for highly structured, continuing interactions among actors of different types.” As in the RD framework, DC scholars also acknowledge a central role of knowledgeable and reflective actors in determining the dynamics conducive of innovation and change in high-level routines. Eisenhardt and Martin (2000), as well as Helfat et al. (2007), explicitly consider DC as purposeful, which indicates a certain degree of intentionality in how DC are performed. In addition, Teece (2012) suggested that: “In dynamically competitive enterprises, there is also a critical role for the entrepreneurial manager in both transforming the enterprise and shaping the ecosystem through *sui generis* strategic acts that neither stem from routines (or algorithms) nor need give rise to new routines” (p.1395).

This discussion suggests that, although DC utilize routines and other organizational processes, they also have an element of agency and intent (Teece 2017, 2018). In their work on how dynamic capabilities are created and shaped, Pandza and Thorpe (2009) identified creative search and strategic sense making as essential components of the managerial agency creating major changes in existing routines. Empirical work further advanced this intuition.

For instance, Tippmann et al., (2014) studied how middle managers at a leading ICT multinational corporation played a central role in the enactment of search routines that reliably stimulated the creation of new solutions to modify the operating routines. Similarly, at Polaroid knowledgeable and reflective actors—new hires with experience—brought new perspectives to how the product-development routine was performed (Tripsas and Gavetti, 2000), and at the oil company Yukos, young managers were hired and trained with the explicit goal of innovatively performing search and experimentation processes in oil exploration and production (Dixon, Mayer, and Day, 2014).

What DC research further adds to the conversation on routines and creativity is the role of organizational context in facilitating or hindering creative managerial action. For instance, Tippmann et al. (2014) noticed that the decision not to store knowledge in a central knowledge repository, combined with a flexible organizational design, greatly facilitated managerial action aimed at promoting creativity and novelty, while Alessi's top management codification of improvements in the product development routine resulted in more reliable creation of innovative design objects (Salvato, 2009). These insights on the role of the organizational context—which is part of what makes routine performance situated—may advance discussion in the RD view.

Insights from RD. The RD approach may substantially add to the insights developed by DC scholars on how routines may engender creativity and innovation. RD scholars showed that although action patterning is guided by a reproduction regime, generative moments in which actors introduce substantial alterations to the action pattern are not infrequent and they promote creativity and novelty. Actually, every instance of routine enactment creates opportunities for novelty (Zbaracki and Bergen, 2010; Rerup and Feldman, 2011).

The RD approach is thus focused on deviations from pattern induced by participants' creativity far more than the DC approach (Sele and Grand, 2016; Sonenshein, 2016), while

recognizing that endogenous stability is possible (Sydow, 2020, *in this book*). As mentioned, at Ubisoft (Cohendet and Simon, 2016) the recombination of existing routines in a new context allowed the firm to recreate its ability to produce innovative and creative videogames. Similarly, at Alessi routine participants performed regulatory actions that directed the creativity of engineers and designers towards the specific needs of each new product-development project (Salvato and Rerup, 2018). In these firms, novelty is a key determinant of competitive advantage and a strategic requirement for firm survival. The RD approach can thus be seen as contributing to the connection between routines and capabilities (Feldman et al., 2016). However, field studies that are squarely focused on routine enactment in highly creative organizations and industries, and an understanding of why and how routine participants can produce truly novel performances while enacting a routine pattern, are still lacking.

3.3. How do routines help organizations maintain both pattern and variety?

DCs and the organizational routines grounding them are paradoxical entities (Peteraf, Di Stefano, & Verona, 2013) because they simultaneously involve stability and change, pattern and variety (Feldman & Pentland, 2003). This paradox has profound practical implications because firms need both the stability of routines and the creativity of their participants to systematically reconfigure resources to adapt to change (Helfat et al., 2007). Both DC and RD theories provide elements to partially untangle this paradox, but their insights have not been integrated. DC theory is excessively focused on the path-dependent, structural and stable components to be able to simultaneously explain change and variety. RD theory does a better job at explaining how organizational participants simultaneously maintain pattern and variety. However, it tends to overlook the role of senior managers in intentionally shaping the performance of routines in the desired direction, which is a central strategic management

function. Despite this disconnection, both theories developed insights from field studies suggesting opportunities for integration and mutual learning.

Insights from DC. DC theory in its present state cannot adequately explain how actions of individual participants are aggregated into a firm-level ability for systematic resource renewal. Nor can it explain how a dynamic, firm-level routine, once the pattern has emerged, can be perpetuated (the stability element), without also curbing the creativity of its participants, on which the dynamic capacity to adapt is premised (the creativity element). Existing accounts fail to compellingly explain how pattern and variety coexist in DC. Polaroid, for instance, lacked the creativity element when it responded inadequately to the emergence of digital imaging in the 1980s. The firm's capabilities and management structural principles, which were centered on instant photography and the razor-blade model, prevented managers to enact constructive opposition to the outdated business model until an electronic imaging team, comprised entirely of new hires, was established after 1990 (Tripsas and Gavetti, 2000). Between 1986 and 1996, Apple lacked the stability element when it failed to assimilate Steve Jobs' creative action into replicable innovation practices, and the company returned to success only after his comeback in 1997 (Heracleous, 2013).

The DC approach is excessively focused on templates, blueprints, and routine structure. This focus results from the need to identify stable organizational traits to explain—and to eventually enhance—a firm's ability to systematically adapt to its environment. The limits of an excessive focus on structure and its stability are well exemplified by a quote from Bingham et al.'s (2015) study of Dow Chemicals. Describing how managers enacted recently developed M&A routines, a senior manager noted: "Each acquisition is completely different. Regretfully, we had a recent acquisition that was too rigidly following the templates. Our group didn't recognize what needed to change on that. I think I have too many people who think if we have a set of guidelines, we have to follow those guidelines" (p.1823). Managers

at Dow Chemicals addressed this problem by creating more structure. In particular, they developed an additional routine assigning a project management coach to each new deal who “would pick and choose what would be the appropriate template, the appropriate process or methodology for that particular transaction . . . We work with the business to select what tool is needed” (p.1823).

A few studies suggest how combining insights from DC and RD may be a fruitful way to solve the pattern vs. variety paradox. Salvato (2009) investigation of the product development DC of a design firm over time offers an example. By tracing the specific actions performed by specific participants enacting the routine at specific times and places, Salvato (2009) identified different ways, or clusters, of routine enactments. Out of the 90 observed enactments over several years, 36 “recipe book” processes closely followed the codified ostensive pattern mandated by top managers. Other 34 processes showed effortful “mutations” introduced by knowledgeable and reflective organizational actors with the aim of adapting the routine to novel circumstances. Interestingly, the remaining 20 product-development processes incorporated some of the previously enacted “mutations,” which top managers have identified as valuable improvements of the routine and, thus, had codified into an adapted “recipe book” ostensive pattern.

Insights from RD. While the DC approach addresses how variety may emerge by designing and implementing patterned capabilities, the RD approach takes a somewhat inverse approach by investigating routines as pattern-in-variety (Cohen, 2007). In the RD view, variation is a natural part of routine. While in DC variation and flexibility somewhat surprisingly emerge from learnt, path-dependent and structured approaches engineered by top managers, RD views pattern as surprisingly emerging from the relentless and situated attempts of participants to adapting task performance to the specific situations at hand. In their longitudinal study of enterprise systems at NASA, for example, Berente, Lyytinen, Yoo

and King (2016) investigated the divergence between ostensive and performative aspects of routines and showed that, in practice, standardization was accomplished through local variation by routine participants, more than through standardized work routines and controls. Similarly, D’Adderio (2014) showed that the dynamic and flexible performance of the production routine by its participants allowed an electronics manufacturer to adapt it to the specific conditions of the local market in which the routine was supposed to be transferred. At Crystal Print, a printing factory, organizational participants adapted routines for measuring ink density and assessing the quality of print copies, which resulted in an adaptation of the standard script that was imposed top-down, to balance efficiency and quality (Aroles and McLean, 2016). At NASA, participants gradually adapted procurement and project management routines to absorb tensions created by the implementation of the ERP system, thus turning routines into “shock absorbers” that continuously reconciled local practices with organizational imperatives (Berente et al., 2016). Future research may combine the insights from DC about how structure and stability engender change and flexibility, with the insights from RD about how constant variations by participants allow structure to perform and maintain generativity.

4. Future research directions.

Combinations of insights and approaches from the RD and DC point to some interesting avenues for future research, and methods to address them. Figure 1 provides an overview of the connections between the DC and RD approaches, and a synthesis of these possible research areas.

--- **FIGURE 1 ABOUT HERE** ---

Figure 1 suggests that DC are grounded in high/second-order routines (or collections/sequences of interacting routines) that act upon (X) lower/first-order ordinary routines (Y) by building, integrating, reconfiguring or releasing them. In turn, ordinary

routines determine task outcomes that, together, contribute to overall firm performance. Both dynamic and ordinary routines include a performative and an ostensive dimension. Both are enacted by routine participants (“from within”) and shaped by senior managers (“from outside”), within an organizational context including the organizational structure, knowledge codification processes and repositories, rules, best practices, and artifacts. Combining insights from the DC and RD frameworks (Tables 3 and 4) suggests research directions in at least three areas: routine participants, ecologies of routines, and routines performance.

4.1. Investigating participants’ intentionality in designing and performing routines

The DC literature provides insights into how senior managers intentionally design high-level routines, while RD provides insights into how routine participants mindfully enact routines and how their actions are shaped by routines. We miss an understanding of how these two different types of intentionality play out and interact in how routines are generated, evolve, and determine their outcomes.

Field research displays the importance of the cognitive representations held by senior managers in directing search processes in new learning environments (Helfat and Peteraf, 2015; Hodgkinson and Healey, 2011). Managerial cognition about firm resources is essential to explaining the extent to which routines are flexibly or rigidly enacted (Danneels, 2008, 2011; Salvato, 2003, 2009). Lacking a strong alignment between senior managers’ and routine participants’ beliefs about the need to promote change through routine enactments, and how such change should be accomplished, the resulting cognitive dissonance will prevent change to happen. With few exceptions (e.g., Lazaric, 2008, 2011; Michel, 2014), however, the RD literature explicitly factors out cognition. However, exclusive focus on situated action as the unit of analysis may prevent our understanding of why and how certain networks of routines promote stability or change despite actors’ intentions. As Feldman et al. (2016) noticed, exploring the relationality of mind and body in enacting routines would allow us to

see new ways in which routine enactments may fail to produce change. The exploration of cognition should be extended beyond the individual routine, to include a broader network including decision-making routines in the executive suite. This leads to the following question: *What types of participants' cognition affect routine performance, and how? (e.g., cognitions about action patterns, relations within and between routines, or artifacts supporting routine enactments).*

Field research on DC shows that lacking strong support from senior managers towards change, existing collections of routines tend to promote stability rather than change. Only a strong cognitive alignment between the beliefs of senior managers and routine participants may allow the latter to promote the flexibility and change required by top managers. A firm's ability to deliver consistent outcomes amidst environmental perturbations results from a combination of planned top-down modifications and endogenous change by employees (Turner and Rindova, 2012). The formation of new dynamic routines often emerges by articulating new procedures through a combination of top-down directions from management, and bottom-up involvement of participants involved in the dynamic routines (Cohendet and Simon, 2016). This literature suggests a number of research questions related to the alignment of cognition of different actors participating in DC and ordinary routines. *What type of cognitive alignment between top managers and routine participants is required to allow routine dynamization—alignment about goals, actions, or patterns? How are the required forms of alignment developed, and how can they break and prevent routine dynamization?*

Scholars in the RD framework (Feldman et al., 2016) describe the nature of organizational routines as shaped by their relationality (vs. substantialism), that is, by relations between the actions that participant perform to enact them. Every time a person participates, he or she experiences different actions, different action patterns, different relationships, and different outcomes. These may, in turn, reshape his or her nature (i.e.,

knowledge, skills, emotions and motivations). An interesting line of research that may emerge from this insight thus refers to the implications of relationality for routine participants and their subsequent involvement in routine performance. *How are routine participants changed and shaped by their participation in routine enactment? How do routine enactments shape participants' habits and path-dependent knowledge, reflection and cognition, emotions and motivations? Under what circumstances does routine enactment make participants more (or less) motivated to dynamically adapt their actions in subsequent enactments of the same or other routines?*

4.2. Mapping ecologies, networks and hierarchies of routines

Conceptual and empirical research in the DC and RD camps convincingly showed that organizational routines at any level (i.e., dynamic or ordinary routines) result from the hierarchical combination of lower-level routines and actions (Kremser and Schreyögg, 2016; Warner and Wäger, 2019). Both DC and RD researchers perform “cuts” (Feldman et al., 2016) that allow them to zoom-in and zoom-out organizational routines, i.e., to trace boundaries around organizational actions in order to identify routines and how they are connected. Yet how these cuts are performed significantly affects the way we understand routines, actions within routines, and routines performance. We miss an understanding of how boundaries traced to identify routines “as entities” affect routines as enactments, and vice-versa. We also lack knowledge of the “ecology of organizational routines,” which involves an understanding of how participants' actions are connected both at different levels within and outside the organization, and over time.

Within organizations, it may hence be interesting to investigate the following questions: *How are routines connected with each other to form sequences and ecologies of routines? To what extent are these connections flexible, thus allowing participants to recombine smaller “chunks” to flexibly perform different tasks? How are DC connected to*

the target routines that they are meant to adapt? Is it only through hierarchy, or are less formal, and potentially unintentional, connections also involved? A promising approach to answering these questions could be, for example, investigating patterns of communication and dialogue across routines through meetings, reviews, coaching, and training (Bingham et al., 2015; Salvato and Vassolo, 2018).

Outside organizations, it may be interesting to explore *if DC and ordinary routines include actants and actions located outside the boundaries of the organization, how these external elements are connected to routines performance, and how they affect their flexibility and task outcomes.* For instance, Danneels' (2002) study showed that in order to be dynamic, DC include network components, in particular relationships with new markets. Future research may extend these insights by further exploring the external actors, artifacts, actions, and knowledge contributing to organizational routine performance. These external elements may make routines more or less flexible and dynamic, thus complementing the explanations of what makes a routine dynamic than those offered by the DC and RD perspectives.

Over time, it may be interesting not only to continue exploring how DC affect ordinary routines “from outside,” and how actors shape them “from within,” but also questions such as: *How do routines transition from one form to the other with one routine succeeding others over time?* For instance, a DC may turn into an ordinary one, and vice versa. Mapping routines as sequences of actions allows to carefully trace their evolution over time, as a number of field studies have shown (e.g., Prange, Bruyaka and Marmenout, 2018; Salvato, 2009).

4.3. Understanding performance outcomes

The DC and RD views are interested in different interpretations of “performance”. Although this is legitimate, the two interpretations capture actual phenomena that affect each other, and that affect (and are affected by) the organizational context in which they happen. We thus

miss an understanding of how top-down managerial actions aimed at shaping DC as entities affect how the underlying routines are performed, and we also miss an understanding of how routine enactments affect (facilitate/hamper) desired performance. Moreover, we still know little about how multiple dimensions of the organizational context affect routine performance and the mutual interaction between DC and ordinary routines.

The organizational context influences participants' search actions, solution development, and routine development (Tippmann et al., 2014). For example, the level of embeddedness of a routine in the organizational context (technological, coordination, and cultural structures) influences how flexibly it is used (Howard-Grenville, 2005). DC cannot be viewed as mere procedures, simple rules, checklists, or standardized artifacts. This limits the possibilities for adaptation in the repetition of DC, i.e., their dynamism. It may thus be interesting to further explore *how the forces and the sociomaterial or sociotechnical mediations underlying the process of DC repetition influence DC effectiveness*, as Aroles and McLean (2016) observed in their study. For example, the same DC routine performed through different sets of artifacts and teams of participants may result in the fulfillment of different (even opposing) goals (D'Adderio, 2014). An interesting avenue to investigate these dynamics could be by *focusing research attention on group structures, processes and psychosocial characteristics, and how they affect how participants enact routines*. For example, as Martin's (2011) study suggested, the degree of social equivalence among routine participants (power parity and similar evaluation) may influence how effectively (creatively and flexibly) they enact routines. Following the lead of Bertels, Howard-Grenville and Pek (2016) research, it may also be interesting to investigate *how organizational cultures, cultural strategies of action, and their skillful manipulation affect how actors perform organizational routines*.

Besides structural components of the organizational context, cognitive elements are also worth being explored. It may thus be interesting to investigate *how differences in the beliefs*

and mindsets on top-managers designing DC and managers enacting ordinary routines may generate cognitive dissonance, which may severely limit the effectiveness of DC work and the dynamism of routines (Tripsas and Gavetti, 2000; Warner and Wäger, 2019).

Finally, routines themselves can be seen as part of the organizational context affecting performance of both DC and ordinary routines. Researchers may thus further explore *what makes some ordinary routines more adaptable and malleable targets of higher-level DC, in line with research that showed the role of target routines as “shock absorbers” in processes of DC implementation*, by reducing the tensions between the rigidity of the planned solution and the messiness of everyday life (Berente et al., 2016). Besides understanding what makes target routines more suitable to be adapted by DC, scholars may also investigate *the role of some routines as “regulatory mechanisms” that contribute to making an organizational capability “dynamic”* (Salvato and Rerup, 2018). Organizational schemata may also play a similar role in driving the effectiveness of DC (Rerup and Feldman, 2011).

5. Conclusion.

Scholars in the social sciences address phenomena with different theoretical and methodological lenses. The different perspectives and interpretations resulting from this legitimate differentiation of viewpoints provide deeper and more nuanced views of organizations and societies. However, at some point in the investigation path of a given phenomenon, different and even opposing views come closer and scholars from different camps happen to be separated by a thin wall of labels and definitions only. At this stage, it may be fruitful to use the elements that separate to build bridges across camps. The fields of dynamic capabilities in strategic management and of routine dynamics in organization theory have apparently reached this stage. The goal of this chapter was to map the two camps, identify legitimate differences and visible commonalities, and trace a path across the bridge. Strategic management and Organization theory scholars may identify fruitful avenues for

mutual learning, while firmly standing on their disciplinary grounds. In particular, DC scholars may benefit from zooming in on managers and the actions they perform when enacting DC and the routines in which they are grounded. In turn, RD scholars may extend their knowledge of actors performing routines if they zoomed out to include the impact of intentional top managers' intervention and of contextual variables on routine patterning.

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Table 1. Routine dynamics and Dynamic capabilities: Commonalities and differences

Dimensions	Routine Dynamics View	Dynamic Capabilities View
Ontology	Social constructionist	Positivist
Theoretical perspective	Pragmatism - Structuration	Behavioral - Evolutionary
Focal interest	<ul style="list-style-type: none"> • Understanding how routine participants perform actions that shape/create (and are shaped by/respond to) patterns • Focus on performing and patterning 	<ul style="list-style-type: none"> • Understanding how performance of high-level routines alters (builds, integrates, reconfigures, releases) lower-level routines and resource configurations • Focus on routine performance and pattern-as-entity
Level of theory ¹ (focal unit of analysis)	<i>Routine</i> (any type of, but mostly ordinary, substantive, first-order) <i>as pattern</i> of observed, situated action	<i>Routine</i> (search, high-level, second-order), or collection of routines, <i>as entity</i>
Level of measurement ²	Actants (routine participants, artifacts, ideas)	Top managers, Routine or collection of routines
Level of analysis ³	Individual actions (typically in first-order, ordinary routines) performed by actants (routine participants, artifacts, ideas)	Instances of second-order routine performance
Position in multi-level hierarchy	<ul style="list-style-type: none"> • Routine (pattern) as the <i>highest</i> (more <i>macro</i>) level of theory. • Main interest is in how individual actions shape and are shaped by action patterns. • Relatively limited interest in what happens <i>outside</i> the routine (i.e., in macro-organizational context and in task outcomes and firm performance) 	<ul style="list-style-type: none"> • Routine (entity) as the <i>lowest</i> (more <i>micro</i>) level of theory. • Main interest is in how routine performance affects task outcomes and firm performance. • Relatively limited interest in what happens <i>inside</i> the routine (i.e., in individual actions and in action patterning)

(1) The *Level of theory*, or (*focal*) *unit of analysis*, is “the level to which generalizations are made” (Rousseau, 1985: 4), i.e., the target (e.g., individual, group, firm) that a researcher wants to depict, explain, and theorize about.

(2) The *Level of measurement* refers to “the unit to which the data are directly attached” (Rousseau, 1985: 4), i.e., the units from which the data are actually collected.

(3) The *Level of analysis* is the unit to which the data are assigned for empirical analysis. It describes if and how collected data are aggregated at different levels (Klein, Dansereau, and Hall, 1994; Rousseau, 1985).

Table 2. Key definitions of dynamic capabilities and connections to organizational routines

Author	Definition	Connections to routines
Teece et al. (1997)	The firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments. Dynamic capabilities thus reflect an organization's ability to achieve new and innovative forms of competitive advantage given path dependencies and market positions (p.516).	Managerial and organizational processes, shaped by the firm's asset positions and molded by its evolutionary and co-evolutionary paths, explain the essence of the firm's dynamic capabilities. Managerial and organizational processes are the way things are done in the firm, or what might be referred to as its routines or patterns of current practice and learning (p.518).
Eisenhardt and Martin (2000)	The firm's processes that use resources – specifically the processes to integrate, reconfigure, gain and release resources – to match or even create market change (p.1107)	Dynamic capabilities are the organizational and strategic routines by which firms achieve new resources configurations as markets emerge, collide, split, evolve and die (p.1107)
Zollo and Winter (2002)	A dynamic capability is a learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness (p.340)	Search routines – those that seek to bring about desirable changes in the existing set of operating routines for the purpose of enhancing profit in the future – are constitutive of dynamic capabilities (p.341)
Winter (2003)	Dynamic capabilities are those capabilities that operate to extend, modify or create ordinary (substantive) capabilities (p.991)	An organizational capability is a high-level routine (or collection of routines) that, together with its implementing input flows, confers upon an organization's management a set of decision options for producing significant outputs of a particular type. The points deserving emphasis here are the connotations of 'routine'—behavior that is learned, highly patterned, repetitious, or quasi-repetitious, founded in part in tacit knowledge—and the specificity of objectives (p.991)
Zahra, Sapienza and Davidsson (2006)	Dynamic capabilities are the abilities to reconfigure a firm's resources and routines in the manner envisioned and deemed appropriate by its principal decision-maker(s) (p.918)	Dynamic capabilities are organizational routines that strengthen with use. The exercise of DC reduces variability in the results, minimizes the costs of repeating these actions, and increases managers' confidence in their future use of these routines (p.928)
Helfat et al. (2007)	A dynamic capability is the capacity of an organization to purposefully create, extend, or modify its resource base (p.4)	A DC consists of patterned and somewhat practiced activity. DC must contain some patterned element (p.5)
Teece (2007)	DC are capabilities that can be harnessed to continuously create, extend, upgrade, protect, and keep relevant the enterprise's unique asset base (p.1319)	One of the microfoundations of DC are the distinct processes and procedures that are put in place inside the enterprise to garner new technical information, tap developments in exogenous science, monitor customer needs and competitor activity, and shape new products and processes opportunities (p.1319, 1323)
Helfat and Winter (2011)	A dynamic capability is one that enables a firm to alter how it currently makes its living, i.e., capabilities that promote economically significant change (p.1244, 1249)	A (dynamic) capability enables repeated and reliable performance of an activity, in contrast to ad hoc activity that does not reflect practiced or patterned behavior (p.1244)

Table 3. Instances of routine dynamics in ten selected DC fieldworks.

Study	Situated actions	Knowledgeable and reflective actors	Stable for now. Stability as an accomplishment	Implications for Routine Dynamics
Bingham, Heimeriks, Schijven and Gates (2015)	Relationality and multiplicity among M&A, alliance and divestiture routines were purposefully created at Dow Chemicals by codifying and transferring knowledge across M&A, alliance and disposal routines.	Reflection on cumulated knowledge by actors participating in M&As at Dow prompted the creation of stable patterns in alliance and divestiture routines. Participants in cross-functional M&A, alliance and disposal teams autonomously changed communication patterns.	Dow Chemicals created a dedicated group to codify and transfer knowledge about M&A, alliance and divestiture routines, i.e., to build stable routines.	Knowledge codification efforts create structure that constraints/guides actions performed in routines. Communication <i>across</i> routines (meetings, reviews, coaching, training) is essential to create action patterns
Danneels (2002)	The specific technologies developed by five high-tech firms made their production and marketing routines highly path-dependent, preventing access to new markets and technologies.	Existing knowledge (e.g., of specific markets and customer segments) and artifacts (e.g., technology) limit the extent to which participants can dynamically adapt routines (e.g., marketing and product-development).	Lacking second-order routines, marketing and product-development routines become highly path-dependent and unchanging. Second-order marketing and R&D routines create relationships and network links with new markets and technologies, which allowed participants to change first-order routines.	In order to be dynamic, second-order routines (DC) include network components, in particular, relationships with new markets.
Danneels (2011)	The Smith Corona brand—part of the firm context—negatively affected innovative routine development enactments. The R&D function never developed unique technologies because it was part of manufacturing.	The persistence of inaccurate mental models and cognitions about key resources—which resulted from limited reflection and learning—prevented Smith Corona managers to flexibly adapt product development routines.	Besides routine patterns, the underlying mental models persisted at Smiths Corona, even if inaccurate. Attributional ambiguity favored the persistence of inaccurate patterns, while constructive conflict would have allowed their adaptation.	Managerial cognition about firm resources is essential to explaining the extent to which routines are flexibly or rigidly enacted. Firm-level resources, such as brand, are a significant component of the material context in which participants enact routines.
Dixon, Meyer and Day (2014)	At the Russian oil company Yukos, how managers performed capabilities was closely related to other processes, such as hiring, training and career	Young managers were hired and trained with the explicit goal of developing search and experimentation in oil exploration and production techniques.	Dynamic capabilities for innovation continuously morphed as a result of senior management interventions, but they were still seen as Yukos' way of doing business.	Senior managers can significantly affect the extent to which routines generate creativity and innovation by acting upon hiring, training, providing financial motivation.

	development, funding and financial bonuses.			
Martin (2011)	Within six firms operating in the software industry, participants' actions are situated in groups structures (composition, incentives, autonomy), group processes (planning, knowledge sharing ...), and group psychosocial characteristics (conflict, affect, emotion).	The level of resource autonomy of individual routine participants affected their capacity and willingness to interact.	Top managers alteration of groups structures and processes altered established patterns of routine interaction.	Group structures, processes and psychosocial characteristics affect how participants enact routines. The degree of social equivalence among routine participants (power parity and similar evaluation) influences how effectively (creatively and flexibly) they enact routines.
Prange, Bruyaka and Marmenout (2018)	At DHL, the transition between an acquisition DC and an internal-development DC resulted from participants performing a bundle of seemingly unintentional situated actions.	Change and transition in and between routines at DHL happened even though managers where not conscious of the features of routines and did not intentionally plan changes.	At DHL, the patterns through which routines changed and stabilized differed across life-cycle stages of their development (reactive sequences were observed for routines established in earlier stages of DC development, whereas linear patterns were found when the whole life cycle of the DC was considered)	Besides combinations of routines, research on DC also points to transitions between routines, with one routine succeeding others over time.
Salvato (2009)	Alessi product-development capability and its changes over time result from participants performing sequences of related actions. Space and physical artifacts are sometimes essential in shaping routine enactments.	Knowledgeable and reflective routine participants intentionally perform experiments to adapt routine enactments to changing circumstances. Experiments that prove effective are retained by top managers and contribute to creating new patterns.	The apparent stability of Alessi product development routine over 15 years results from constant efforts of participants to incrementally adapt it, and of senior managers to formalize emerging adaptations.	Mapping routines as sequences of actions allows to carefully trace their evolution over time. Senior managers play a key role in shaping routine enactments by formalizing successful experiments performed by participants.
Tippmann, Sharkey Scott and Mangematin (2014)	At Gamma, a leading ICT multinational corporation, the flexibility of the organizational structure and not storing knowledge in central repositories, triggered knowledge search routines	Elements of Gamma's organizational context significantly affected middle managers' knowledge and reflective behavior and, therefore, their search actions	At Gamma, routines were continuously morphing due to the efforts of middle managers at routine modification/generation performed by leveraging knowledge architecture competences	The organizational context influences participants' search actions, solution development and routine development.

Tripsas and Gavetti (2000)	At Polaroid, past routines affected how routines for innovation and change were performed, preventing creativity and innovation.	Knowledgeable and reflective actors (new hires with experience) brought new perspectives to how the product-development routine was performed.	Product development routines and their outcomes were remarkably stable despite intentional attempts at altering their performance	Prior routines and strongly-held top management beliefs may dominate routine performance by generating cognitive dissonance between senior managers and routine participants, which severely limits routine dynamics and task outcomes.
Warner and Wäger (2019)	Dynamic Capabilities for digital transformation in 7 German firms undergoing digital transformation, resulted from a set of 9 lower-level sub-capabilities, which in turn were grounded on participants' situated actions.	Developing a digital transformation DC depended on the mindset of managers involved. Lacking this widespread mindset, digital transformation did not start or succeed, despite top-down efforts of top managers.	Observed digital transformation DC were continuously morphing because they first resulted in the replacement of the prior business model, followed by changes in the collaborative approach among participants, further followed by a change in organizational culture.	The extent and effects of the dynamics of organizational routines significantly depend on the mindset of participants. Higher-level routines result from the hierarchical combination of lower-level routines and actions.

Table 4. Instances of dynamic capabilities in ten selected RD fieldworks.

Study	Contribution of routines to firm-level capabilities for building, integrating, reconfiguring, releasing resource configurations	Contribution of routines to economically-significant change/Competitive advantage	Implications for Dynamic Capabilities
Aroles & McLean (2016)	Organizational participants adapted routines for measuring ink density and assessing the quality of print copies at Crystal Print, a printing factory. This resulted in an adaptation of the standard script that was imposed top-down, to balance efficiency and quality.	Multiple adaptations by routine participants allowed Crystal Print to reduce the cost of printing, by monitoring ink density, and to keep the “print” quality of the copy.	DC cannot be viewed as mere procedures, simple rules, checklists, or standardized artifacts. This limits the possibilities for adaptation in the repetition of DC, i.e., their dynamism. The forces and sociomaterial or sociotechnical mediations underlying the process of DC repetition must be taken into account.
Berente, Lyytinen, Yoo & King (2016)	Participants gradually adapted procurement and project management routines to absorb tensions created by the implementation of an ERP system at NASA. Routines essentially served as “shock absorbers” that continuously reconciled local practices with organizational imperatives	The role of routines as “shock absorbers” brought in stability and achieved integration and control at the organizational level, although sacrificing integration and control at the local level.	Organizational routines may play the role of “shock absorbers” in processes of DC implementation, by reducing the tensions between the rigidity of the planned solution and the messiness of everyday life. What makes a DC truly dynamic in practice is the adaptability of the routines upon which the DC operates.
Bertels, Howard-Grenville & Pek (2016)	Organizational members of a Canadian oil company – which introduced an operational compliance routine that clashed with the existing organizational culture – shaped the routine’s artifacts and expectations to adapt it to organizational culture.	The adaptation of the compliance routine by participants allowed the company to become compliant with international operational practices, while the company had previously operated as a scrappy pioneer developing engineering projects in remote environments under tight timelines	The integration of a DC that is a poor fit for the adopting organization, because it clashes with the target firm’s culture, involves members’ skillful manipulation of both how they perform the routine(s) composing the DC, and how they use cultural strategies of action.
Cohendet & Simon (2016)	At Ubisoft (a videogame development office) the cancellation of a potential blockbuster because of a lack of originality and strategic differentiation prompted the recombination of routines to “unfreeze” the organization and reboot creativity.	The recombination of existing routines in a new context allowed Ubisoft to recreate its ability to produce successful videogames that were appreciated by customers.	DC do not necessarily emerge by imposing new procedures on an existing hierarchy. The formation of new dynamic routines may also emerge by articulating new procedures through a combination of top-down directions from management, and bottom-up involvement of participants involved in the dynamic routines.

D'Adderio (2014)	An electronics manufacturer dynamically directed the replication of the manufacturing routine of a complex server product in a different location. By involving different “communities” (groups, teams, functions) and different artifacts (models, rules, procedures, lists) the production routine was first directed towards exact replication (alignment), and later towards improvement and adaptation.	The dynamic and flexible performance of the production routine allowed the electronics manufacturer to adapt it to the specific conditions of the local market in which the routine was transferred.	Firms attempting to transfer a DC in other organizational units must be aware that transfer processes actually undergo an active, emergent, and creative process of routine replication. The same DC routine performed through different sets of artifacts and communities may result in the fulfillment of different (even opposing) goals.
Dittrich, Guérard & Seidl (2016)	At CellCo—a start-up company in the pharmaceutical industry—talk allowed participants to dynamically reconfigure the shipping routine as they performed it.	Talk among CellCo participants allowed them to adapt the shipping routine by retaining the most effective adaptations that were suggested and tested as the routine was performed.	Talk among people who enact a DC allows them to dynamically adapt the DC from within, and as it is practiced, to the shifting needs of markets and customers.
Turner and Rindova (2012)	Routine participants in six waste management organizations actively reconfigured routes to adapt to perturbations	Microadaptations of routine performances allowed the organizations to deliver relatively consistent outcomes to customers.	A firm’s ability to deliver consistent outcomes amidst environmental perturbations results from a combination of planned top-down modifications and endogenous change by employees.
Howard-Grenville (2005)	Participants of the “roadmapping” routine at a high-tech firm dynamically adapted it to different activities as materials planning, product development, and even “people development”	The dynamic adaptation of the roadmapping routine to different uses allowed the firm to address its changing environment with a single approach, thus reducing costs and complexity	The level of embeddedness of a routine in the organizational context (technological, coordination, and cultural structures) influences how flexibly it is used.
Rerup and Feldman (2011)	Trial-and-error learning aimed at facing the problems emerged in enacting the recruiting routine, determined a reconfiguration of the originally espoused strategic schema.	Changes in schemata engendered by routine dynamics allowed Learning Lab Denmark to adapt its strategies to a shifting environmental context.	Organizational routines and the schemata that guide firm strategies are “coconstituted.” Not only schemata drive routines performance (as in DC), but routine enactments alter schemata.
Salvato & Rerup (2018)	Product development routines at Alessi behave as DC—embedded mechanisms of “routine regulation” (activation, repression, alternative splicing) allow participants to reconfigure people, actions and artifacts, aligning them to market needs	“Routine regulation” allowed Alessi to anticipate changes in the market, thus strengthening its competitive advantage over decades.	Mechanisms of “routine regulation” contribute to making an organizational capability “dynamic.”

Figure 1. Future research directions



