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Dynamic capabilities:

An exploration of how firms renew their resource base¹

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Abstract

The aim of this paper is to extend the concept of dynamic capabilities. Building on prior research, we suggest that there are three levels of dynamic capabilities which are related to managers' perceptions of environmental dynamism. At the first level we find *incremental* dynamic capabilities: those capabilities concerned with the continuous improvement of the firm's resource base. At the second level are *renewing* dynamic capabilities, those that refresh, adapt and augment the resource base. These two levels are usually conceived as one and represent what the literature refers to as dynamic capabilities. At the third level are *regenerative* dynamic capabilities, which impact, not on the firm's resource base, but on its current set of dynamic capabilities i.e. these change the way the firm changes its resource base. We explore the three levels using illustrative examples and conclude that regenerative dynamic capabilities may either come from inside the firm or enter the firm from outside, via changes in leadership or the intervention of external change agents.

Key words

Dynamic capabilities; Environmental dynamism; Managers; Resource-based view

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Introduction

The concept of dynamic capabilities (Eisenhardt and Martin, 2000; Teece *et al.*, 1997) has evolved from the resource-based view (RBV) of the firm (Barney, 1986, 1991; Wernerfelt, 1984). RBV proponents argue that simultaneously valuable, rare, inimitable and non-substitutable resources can be a source of superior performance, and may enable the firm to achieve sustained competitive advantage (Barney, 1991). Dynamic capabilities have lent value to the RBV arguments as they transform what is essentially a static view into one that can encompass competitive advantage in a dynamic context (Barney, 2001a, b). Dynamic capabilities are “the capacity of an organization to purposefully create, extend or modify its resource base” (Helfat *et al.*, 2007, p. 1) and over the last few years the concept has received much attention in the form of publications (e.g. Eisenhardt and Martin, 2000; Helfat and Peteraf, 2003; Teece *et al.*, 1997; Zollo and Winter, 2002) and conference presentations (e.g. Academy of Management meeting 2004-2006; Strategic Management conference 2004-2006). However, as highlighted in the *British Journal of Management* Special Call for Papers on ‘The Practice of Dynamic Capabilities: Theory Development and Research’ and by Helfat *et al.* (2007) the concept is still in need of theoretical and empirical development.

In this paper we aim to develop the notion conceptually. Specifically we build on the work of Teece *et al.* (1997), Eisenhardt and Martin (2000) and Helfat *et al.* (2007) concerning what constitutes a dynamic capability and on the suggestions from Collis (1994), Danneels (2002), Winter (2003), and Zahra *et al.* (2006) that

there are *hierarchies* of capabilities. We begin by explaining dynamic capabilities as they are currently understood. Then, adapting the extant work on hierarchies of capabilities, we propose that there are three distinct types of dynamic capabilities. First, starting with Eisenhardt and Martin's (2000) argument that dynamic capabilities may also be used in stable environments, we suggest that the generic concept of dynamic capabilities can be decomposed into two distinct levels: *incremental* dynamic capabilities and *renewing* dynamic capabilities. Then building on Winter's (2003) paper where he mentions that dynamic capabilities may need to be refreshed, we propose that the firm may also need '*regenerative*' dynamic capabilities. We explain that the resulting effect of a regenerative dynamic capability is that it renews the firm's current set of dynamic capabilities. We also propose that each level of dynamic capability will be applied according to managerial perceptions of environmental dynamism i.e. that the trigger to use different levels of change capability is a function of managerial perceptions of the need for change. Clearly, the degrees of organizational change associated with each level of capability vary from minor, where incremental capabilities are being applied, through to major where regenerative capabilities are introduced. Moreover, we would expect incremental changes to the resource base to be an almost continuous process, renewal of dynamic capabilities to be applied periodically, and regenerative capabilities to be infrequently experienced. This raises interesting questions about the extent to which regenerative and indeed renewing capabilities can be viewed as *repeated* performances, or *routines*. We take up this issue later in the paper.

We also take into account managerial perceptions of both the internal and external environments that impact on their decisions to use different levels of dynamic capabilities (Stimpert and Duhaime, 1997; Weick, 1979). Managerial

perceptions affect managerial behaviour and specifically their behaviour towards the renewal of their firm's resource base (Adner and Helfat, 2003; Helfat *et al.*, 2007). We take the position that the current beliefs managers hold about whether their organization is successful, and their perceptions of the firm's environment, should be a primary focus of inquiry. This argument has been well rehearsed in the literature (see for instance Anderson and Paine, 1975). This perspective allows us to adopt a contingency approach to our analysis as we discuss different levels of dynamic capability in different environmental states. Aragon-Correa and Sharma (2003) also take this stance and like them here we are answering the call from many RBV authors for a contingency perspective on the RBV (Barney, 2001a; Priem and Butler, 2001a, b). Hence, we take the view that what counts is the perceived environment and perceived resources (Crotty, 1998; Weick, 1979), and that manager's perceptions, as suggested by Adner and Helfat (2003), are critical determinants of the decisions to develop and deploy different forms of dynamic capability. It also means, following from Helfat *et al.* (2007, p. 20), we recognise that managers "have particular importance for dynamic capabilities" and that to fully understand dynamic capabilities we need to consider what they perceive and act upon in terms of their environment and resources. Expressed differently, it also means that we are essentially taking a *micro* perspective of organizations; we acknowledge that it is individuals and what they do that matters (Felin and Foss, 2005; Orlikowski, 2002).

After the description of the three levels of dynamic capabilities we discuss whether dynamic capabilities necessarily lead to advantage, and then consider some managerial implications of these ideas. We conclude with some areas for future research and a summary.

Theoretical background

Dynamic capabilities have been defined as “the capacity to renew competencies so as to achieve congruence with the changing business environment” by “adapting, integrating, and reconfiguring internal and external organizational skills, resources, and functional competencies” (Teece *et al.*, 1997, p. 515). More recently, Helfat *et al.* (2007, p. 1) have defined a dynamic capability as “the capacity of an organization to purposefully create, extend or modify its resource base”. It is this definition that we have adopted to facilitate the development of our argument. In line with Helfat *et al.* (2007) we use the term ‘resource’ in its broad sense (Barney, 1991), and hence it includes activities, capabilities, etc., which allow the firm to generate rents.

Danneels (2002) argues that it is essential for the RBV to have a dynamic perspective, so as to understand how firms evolve over time, through their deployment and acquisition of resources, and because firms must continuously renew and reconfigure themselves if they are to survive (see also Zahra *et al.*, 2006). Our paper attempts to further the understanding of how firms reconfigure themselves by ‘unpacking’ the notion of dynamic capability into three levels, one of which addresses the renewal of firms’ extant dynamic capabilities.

Dynamic capabilities are built rather than bought in the market (Makadok, 2001). They are organizational processes in the most general sense (Helfat *et al.*, 2007) or routines (Zollo and Winter, 2002) which may have become embedded in the firm over time, and are employed to reconfigure the firm’s resource base by deleting decaying resources or recombining old resources in new ways (Simon and Hitt, 2003).

This means that dynamic capabilities are viewed to be essentially path dependent (Dierickx and Cool, 1989), as they are shaped by the decisions the firm

has made throughout its history, and the stock of assets that it holds (Eisenhardt and Martin, 2000; Zollo and Winter, 2002). Path dependency “not only defines what choices are open to the firm today, but...also puts bounds around what its internal repertoire is likely to be in the future” (Teece *et al.*, 1997, p. 515). Path dependency could be grounded in knowledge, resources familiar to the firm (Monteverde and Teece, 1982), or influenced by the social and collective nature of learning (Teece *et al.*, 1997).

This suggests that learning plays a significant role in the creation and development of dynamic capabilities. This is illustrated, for instance, by Eisenhardt and Martin (2000) and Zollo and Winter (2002) who explain that learning is at the base of dynamic capabilities, and guides their evolution (for a fuller discussion on the genesis and evolution of dynamic capabilities, see Zollo and Winter, 2002). Learning is also considered as a dynamic capability itself, rather than an antecedent of it. As such, learning as a dynamic capability has been identified as “a process by which repetition and experimentation enable tasks to be performed better and quicker” (Teece *et al.*, 1997, p. 520). Zollo and Winter (2002, p. 339) attempted to meld these two positions by explaining that “dynamic capabilities are shaped by the co-evolution of learning mechanisms”.

Helfat and Peteraf (2003) emphasise that to qualify as a dynamic capability, a capability not only needs to change the resource base, but it also needs to be embedded in the firm, and ultimately be repeatable. Those are key issues in the dynamic capability conversation, and we have addressed these criteria in our following theoretical development of the dynamic capability construct.

Dynamic capabilities are argued to comprise of four main processes: reconfiguration, leveraging, learning and integration (Bowman and Ambrosini, 2003

based on Teece *et al.*, 1997). Reconfiguration refers to the transformation and recombination of assets and resources, e.g. the consolidation of manufacturing resources that often occurs as a result of an acquisition. Leveraging refers to the replication of a process or system that is operating in one area of a firm into another area, or extending a resource by deploying it into a new domain, for instance applying an existing brand to a new set of products. As a dynamic capability, learning allows tasks to be performed more effectively and efficiently, often as an outcome of experimentation, and permits reflection on failure and success. Finally, integration refers to the ability of the firm to integrate and coordinate its assets and resources, resulting in the emergence of a new resource base.

Hierarchies of dynamic capabilities

As discussed in the introduction our aim is to extend the dynamic capabilities argument and propose that there are three main orders or levels of dynamic capabilities, including dynamic capabilities that not only change the resource base, but which can also change a firm's extant set of dynamic capabilities. Before going further we explore the current literature on the subject of hierarchies or orders of dynamic capabilities.

Collis (1994) first proposed that there might be distinct levels of dynamic capability. He suggested four categories of capabilities, the first being the resource base itself. The second and third categories, which Collis (1994) explains are closely related and difficult to distinguish, are both dynamic capabilities in terms of both Teece *et al.*'s (1994) and Helfat *et al.*'s (2007) definitions given earlier (Winter (2003)

takes a similar line). In broad terms both Collis (1994) and Winter (2003) distinguish between the modification of the resource base and the creation and extension of the resource base. The fourth category is what Collis (1994) labels 'higher order' or 'meta-capabilities' and it relates to learning-to-learn capabilities. He also states that meta-capabilities can go on *ad infinitum*, there is a kind of infinite wave of capability to renew the capability that renews the capability etc. Thus dynamic capabilities that impact upon current dynamic capabilities can be seen to be, to use Collis' (1994) term, meta-capabilities. Danneels (2002) is one of a few authors to develop Collis' (1994) ideas. He proposed two competency types: first-order competencies, which constitute the ability to achieve an individual task; and second-order competencies: the firm's ability to renew itself through creating new first-order competencies. These contributions hint at circumstances similar to those we consider here, however we would view Danneels' (2002) first order capabilities as being the firm's extant resource base, the resources that allow the firm to directly earn a living (Winter, 2003), and his second order capabilities refer to dynamic capabilities that enable the creation of new resources. Danneels (2002) does not explicitly consider the issue of how dynamic capabilities themselves might be changed.

Winter (2003) further progressed the idea of a capability hierarchy. His hierarchy begins with operating capabilities or 'zero-level' capabilities which allow firms to earn a living in the present (in other words, these are the resource base). He then describes first-order capabilities that allow for a change in zero-order capabilities to occur, for example they effect changes to the production process. Finally he considers higher-order capabilities that are the outcome of organizational learning which result in creating or modifying a firm's dynamic capabilities. However, like Collis (1994), he does not discuss this capability in great depth.

In other research, Brady and Davies (2004) posit that fundamental changes in the environment, or shifts in the firm's position, must be responded to innovatively, by exploring unknown alternatives and renewing capabilities, and Zahra *et al.* (2006, p. 947) advocate that an "infinite spiral of capabilities to renew capabilities could be conceived". They further comment that these capabilities would have the ability to change how the firm solves its problems: "a higher-order dynamic capability to alter capabilities" (Zahra *et al.*, 2006, p. 921).

Hence, we build on the work of Danneels (2002), Winter (2003), and Zahra *et al.* (2006) to aid us in developing a better understanding of dynamic capabilities. It is worth noting that the notions of orders or hierarchies of change have been explored in other literature, particularly in the fields of organizational learning (Argyris and Schon, 1974, 1978; Bateson, 1972) and organizational change (Watzlawick *et al.*, 1974). While, within the confines of this paper, we will not review such literature, we acknowledge that these complementary fields have influenced the dynamic capability literature and the work on orders of dynamic capabilities.

Argyris and Schon (1974), who draw on Bateson's (1972) research, explain that single-loop learning permits the correction of errors by making changes to routine behaviour and therefore allowing the organization to continue along its current course. Argyris and Schon (1978) explain that with single-loop learning individuals react to changes in their internal and external environment, yet the only learning that occurs is consistent with what is already known in the organization, and the only change that takes place is within the norms of the organization.

In contrast, organizations have difficulty with double-loop learning, where errors are corrected for by examining the fundamental state of the organization, and making modifications to, for example, its norms, values and objectives (Argyris and

Schon, 1974, 1978). They explain that change must happen to the organization's norms because the usual error-correction methods are not sufficient to counter the change in the internal or external environment. Individuals recognise that they "cannot correct it (an error) by doing better what they already know how to do" (Argyris and Schon, 1978, p. 22). To progress they must instead restructure the organizational norms i.e. learning must take place (Argyris and Schon, 1978).

The change literature also discusses changes that alter existing change processes. Watzlawick *et al.* (1974) explain that there are two types of change: first-order change that "occurs within a given system which itself remains unchanged", and second-order change "whose occurrence changes the system itself" (Watzlawick *et al.*, 1974, p. 10). The authors explain second-order change as a type of reframing of a problem, because first-order change only explicates the problem further, as it is not enough of a change to alter the situation or develop a solution. In broad terms we can see how Winter's (2003) second order of dynamic capabilities can be associated with single loop learning and first-order change as they effect changes to the resource base, but the way that these changes are performed do *not* change. Winter's (2003) higher order of dynamic capabilities can be related to double loop and second-order change as they are transformational in nature.

In what follows we extend this literature by first considering managerial perceptions of environmental dynamism, and by proposing three distinct levels of dynamic capabilities: incremental dynamic capabilities, renewing dynamic capabilities and regenerative dynamic capabilities.

Environmental states and dynamic capabilities

The initial rationale for developing the concept of dynamic capabilities derived from a concern that the RBV appeared to apply primarily to firms in essentially static environments (Priem and Butler, 2001a). Resource advantages that may have been built up over many years through path dependent development processes would have enduring rent generating potential only if the environments the firms compete in did not undergo significant change, i.e. if the environment was stable. In stable environments there are external changes, but these changes are largely predictable and incremental, and the rate of change is low, relative to that experienced by other firms in other environments (Duncan, 1972; Mintzberg, 1979). In these circumstances we would presume that the resource stock remains essentially stable. In contrast, where firms are facing fast paced change, unpredictable events and unanticipated discontinuities in dynamic environments (D'Aveni, 1994), resource advantages are likely to be rapidly eroded. In such a context the firm's ability to create, adapt and reconfigure resources, i.e. its dynamic capabilities, is critical; firms need to refresh their resource stock to have an advantage. In the following section, building first on Eisenhardt and Martin's (2000) argument that dynamic capabilities are at play in both stable and dynamic environments we explain that the current notion of dynamic capabilities can be decomposed into two distinct types: incremental dynamic capabilities and renewing dynamic capabilities. Then, building upon Winter's (2003) 'higher-order capabilities' we argue how a third type of dynamic capability (regenerative dynamic capabilities) are necessary for the renewal of dynamic capabilities.

Before embarking upon this elaboration we explain our cognitive approach to the notions of a stable or dynamic environment. As we have discussed the RBV and

dynamic capability literature implicitly or explicitly distinguishes between these two broad states of the environment. The RBV explains what the sources of sustained advantage are in stable environments, and the dynamic capability view offers an explanation as to how firms can sustain resource-based advantages in dynamic environments. However as highlighted in the introduction, and reported by Anderson and Paine (1975), there is a large body of evidence which shows that realised strategies reflect managerial perceptions rather than objective characteristics (Child, 1972; Duncan, 1972). Hence when considering environmental dynamism it is critical to do so in terms of, firstly, whether managers perceive that there are changes in their external environment, and secondly if they perceive their firm needs to change. In other words, we have two types of change: external and internal. Managers may perceive that environmental conditions are stable or changing. Externally perceived changes might include competitors' introducing new products, shifts in government legislation, or changes in customer needs. Managers may also decide to instigate internal changes independent of any perceptions that the external environment is changing. These changes might be triggered by dissatisfaction with current performance, the imposition of budgeting restrictions, or may reflect the desire of a new manager to make an impact. So following Helfat *et al.*'s (2007) definition that dynamic capabilities are *purposefully applied*, managerial perceptions of the need to change are critical triggers for the performance of dynamic capabilities. To summarise, we would argue that to understand dynamic capabilities we need to consider managerial perceptions of the need for change, which are functions of their perceptions of their external and internal (firm) environments (e.g. see Hambrick and Mason, 1984). These perceptions may or may not act as triggers to either change the resource base, or to change the way the resource base is changed. Thus it is

entirely possible for managers in objectively dynamic environments, to mis-perceive the need for change and hence fail to apply appropriate dynamic capabilities (we develop this issue later on in the discussion section). Alternatively, managers may trigger change where they are driven by internal pressures for enhanced performance.

Taking all this into account means that a perceived stable environment is an environment where external or internally triggered changes are largely seen by managers to be predictable and incremental, with a low rate of change. A perceived dynamic environment is an environment where managers perceive fast paced change, and even unpredictable changes and unanticipated discontinuities.

Incremental dynamic capabilities

Where an essentially stable environment is perceived there would still be some requirement to adapt the resource stock of the firm. Although the pace of change is slow and the extent of change is limited, requirement for incremental adjustments and improvements to the resource stock of the firm would remain. Thus, even in stable environments there is likely to be a need for continuous improvement, but the resource stock would not be transformed through these change processes, it would be incrementally adjusted and adapted. Continuous improvement is sufficient to ensure that the resource stock maintains its value in this relatively stable context. Continuous improvement relates to the continual and often small adjustments that a firm makes to its products or operations (Bessant and Caffyn, 1997). This form of dynamic capability describes processes that effect changes, albeit incremental changes, to the resource base of the firm. Thus we label this first level of dynamic capability as *incremental*. An example might be that of e2v, and the company's

constant improvement of their waste management and energy use. To ensure maximum energy usage they keep reconfiguring their processes and systems so that they reduce energy consumption; they work on being able to recycle more and more waste in terms of quantity e.g. tonnes of cardboard and types e.g. paper, oils, solvents, etc. This suggests that dynamic capabilities do not only happen in a 'rapidly changing environment' (Teece *et al.*, 1997), but that our argument is in line with Eisenhardt and Martin (2000) who explain that in more stable market contexts dynamic capabilities are simple and iterative, and rely on the incremental and continuous improvement of extant resources. Moreover, these incremental dynamic capabilities are likely to be repeatable and embedded in the firm (Helfat and Peteraf, 2003; Helfat *et al.*, 2007). Thus these processes of continual improvement would be stable patterns of the firm (Zollo and Winter, 2002). Hence although this type of dynamic capability brings an adaptive change to the resource base, the ways these changes are effected do not change.

Renewing dynamic capabilities

This is the situation most commonly referred to in the dynamic capability literature, notably by Teece *et al.* (1997), Eisenhardt and Martin (2000) or Helfat *et al.* (2007) (it also refers to Winter's (2003) first order capabilities). These dynamic capabilities are utilised to sustain a rent stream in changing environments, they refresh and renew the nature of the resource stock, rather than incrementally adapt it. They are needed as resource-based advantages in dynamic environments may well be rapidly eroded. Examples of such dynamic capabilities would, for instance, include brand extension such as those undertaken by Virgin, or process replication as performed by Sony. Virgin has generated new resources by deploying its valuable brand into new

domains e.g. airlines, mobile phones, cosmetics, bridal wear, cola, railways. As far as Sony is concerned they have applied their know-how in miniaturization to all their products e.g. radio, hi-fi, computers or personal navigation.

As the environment shifts, resource advantages can become disadvantages if no attempts are made to refresh the resource stock. As Leonard-Barton (1992) explains, valuable resources can become core rigidities if they are not modified, combined with different equipment or extended for new use, such as to produce new product lines. These renewing dynamic capabilities are of a different order to incremental dynamic capabilities. They are not merely about continual, incremental changes; they are concerned with modifying the resource stock in such a way that its utility is altered so that rent generation is sustained. So we could differentiate incremental dynamic capabilities from renewing capabilities as follows. Where incremental capabilities are applied the resource stock remains essentially the same, but the resources undergo continuous development or evolution. For example, a successful brand might be continually updated to keep its value over time e.g. the *KitKat* chocolate bar that has been around for seventy years has undergone periodic adjustments and enhancements, but the basic brand remains essentially stable. In contrast, where renewing capabilities are employed new resources are either created, introduced, or resources are combined in new ways. Hence a renewing capability would be the introduction of new product lines, or the extension of a brand into a new product application e.g. a *KitKat* lunch box.

These second level dynamic capabilities are developed and embedded within the firm as they progress through time, via the accumulation of experience and specific investments (Makadok, 2001; Maritan 2001; Zollo and Winter, 2002). Sustaining these dynamic capabilities is an essential requirement for any firm to

continue having a resource base which allows them to earn a living (Winter, 2003), thus the costs of sustaining dynamic capabilities is most likely inevitable for any firm in a dynamic environment (Bowman and Ambrosini, 2003). Some firms may try to avoid incurring these costs, but they take a risk of not being able to appropriately renew their resource base.

The current literature tends not to distinguish between incremental dynamic capabilities and renewing dynamic capabilities, they are usually described as one: they are explained as being 'dynamic capabilities'. Both of these levels are used for changing the resource base. However whilst incremental dynamic capabilities are about adjusting, and incrementally improving "the current resource base in the direction of more of the same" (Helfat *et al.*, 2007, p. 1), renewing dynamic capabilities are concerned with "the capacity of an organization to purposefully create, extend, or modify its resource base" (Helfat *et al.*, 2007, p. 1) to sustain a rent stream. Without such renewing of dynamic capabilities the organization would not be able to "survive and prosper under conditions of change" (Helfat *et al.*, 2007, p. 1).

In this section we have elaborated upon the concept of dynamic capabilities: first we have highlighted that while dynamic capabilities are necessary to face environmental changes, we need to consider managerial perceptions of environments, rather than purely objective environmental measures, as perceptions impact upon realised strategies and the deployment of dynamic capabilities. Secondly we argued that 'dynamic capabilities' can be understood at two distinct levels. We now turn our attention to the way firms can change, not their resource stock, but their extant set of dynamic capabilities, i.e. we now consider how firms

might modify and extend their current dynamic capabilities. We call these higher level capabilities 'regenerative dynamic capabilities'.

Regenerative dynamic capabilities

When current dynamic capabilities are perceived to be insufficient to impact appropriately upon a firm's resource base the dynamic capabilities themselves need to be renewed. In other words, the firm needs to change the way it purposefully creates, extends or modifies its resource base (Helfat *et al.*, 2007). In these circumstances a firm needs a set of dynamic capabilities to act upon the extant set of currently embedded dynamic capabilities, thus allowing it to change its resource base in new ways. These *regenerative* dynamic capabilities allow the firm to move away from previous change practices, towards new dynamic capabilities.

Regenerative dynamic capabilities are likely to be deployed by firms whose managers perceive that the environment is turbulent, where external changes are non-linear and discontinuous (D'Aveni, 1994). As Zahra *et al.* (2006) explain in volatile environments such as in high-technology industries firms need to repeatedly reconfigure their set of valuable resources and as a corollary they need to be able to have the capacity to modify their current dynamic capabilities. The presence of these regenerative dynamic capabilities can be inferred, as it may help explain why some firms find success in the face of environmental turbulence, whilst their competitors fail (Danneels, 2002). Indeed many firms facing a discontinuous environment are not able to overcome their own organizational inertia and have failed (Gilbert, 2005), as they have not changed internally themselves (Miller and Friesen, 1980; Tushman and Romanelli, 1985). Gilbert (2005) reports that part of the problem is a failure to alter the processes that use the resources (Leonard-Barton, 1992; Nelson and

Winter, 1982), we argue here that firm failure could be attributed to managers using the extant set of dynamic capabilities, when these are not appropriate for the new environment.

If an environment is perceived to be novel or rapidly changing, firms may need to move away from previous dynamic capabilities towards new ones suitable to the new environment (Brady and Davies, 2004). This means that the purpose of regenerative dynamic capabilities would be to embed new, or to improve extant, dynamic capabilities. Regenerative dynamic capabilities like any other dynamic capabilities come in many forms, but they may be very similar to the renewing capabilities e.g. they might involve restructuring, learning, leverage, but the key difference is that whereas renewing capabilities operate directly on the resource base, regenerative capabilities impact on the renewing or incremental dynamic capabilities. As such they have an *indirect* impact on the resource base. Thus the regenerative capability would impact the extant renewing capabilities at t1, leading to changes in these renewing capabilities in t2, which ultimately lead to new resources being created in t3.

This leads to the question of the extent to which regenerative dynamic capabilities can be considered to be in any way repeated performances; one of the requirements for an activity or process to be labelled a capability (Helfat *et al.*, 2007). We address this issue in a following section. In figure 1 we summarise how the three levels relate to each other and to the resource base, and in table 1 we show how these levels relate to the previous literature.

Insert Figure 1 about here

Insert Table 1 about here

If we consider the four main dynamic capabilities of reconfiguration, leveraging, learning and integration² (Bowman and Ambrosini, 2003), where a firm currently uses only the leveraging capabilities a regenerative dynamic capability would allow it to develop, for instance, a *reconfiguration* dynamic capability, e.g. to develop the ability to identify and integrate appropriate acquisitions. Alternatively, they may develop an *integration* dynamic capability allowing it to develop a culture encouraging collaboration, experimentation and hence facilitating innovation. Therefore the regenerative dynamic capability would act to change dynamic capabilities by either changing the form of the dynamic capability (e.g. from leverage to reconfiguration) or altering the mix of capabilities (adding leverage to and existing reconfiguration capability). For example, an SBU may have the extant dynamic capabilities of leveraging best practices within its boundaries; the regenerative dynamic capability would extend the leveraging processes to encompass other related SBUs in the corporation. In what follow we offer two case examples.

Founded in 1979, International Greetings (IGR) is one of the world's leading manufacturers of greetings products (International Greetings, 2007). In the early years, IGR renewed its resource base essentially through learning which led to new product developments (e.g. in new types of greetings card; gift wrapping, crackers, stationery and accessories) and leverage, notably through the acquisition of character licenses e.g. Shrek, The Simpsons, Harry Potter. It also focused on the UK market. Recently, to avoid pressures on margins IGR moved production to Eastern Europe and China whilst still creating products and leveraging licenses very successfully. Then to achieve growth IGR embarked on a series of acquisitions in the US, Netherlands, and Germany. This suggests that IGR, having grown through

² We used this list for convenience, but any other list of dynamic capabilities could be used (e.g. Eisenhardt and Martin, 2000; Teece *et al.*, 1997).

the 1980s and 1990s by refreshing their resource base via leverage and learning, found that these dynamic capabilities were insufficient to enable profit growth in the more competitive environment facing them since 2000. However rather than abandoning its leverage and learning processes, it augmented these capabilities by embarking on two forms of reconfiguration: the transferring of production to lower cost countries, and the acquisition of other firms. This augmenting of dynamic capabilities is evidence of the exercise of regenerative activity. No dynamic capabilities have been eliminated, and new capabilities have been introduced. The regenerative dynamic capabilities can be seen here as being about learning (Teece *et al.*, 1997) as IGR basically renewed its dynamic capabilities by enhancing existing capabilities and identifying new opportunities for their use.

GlaxoSmithKline (GSK) also provides an interesting illustration of regenerative dynamic capabilities in operation (Heller, 2007). Since the 1950s the resource base of large pharmaceutical companies has consisted of patented drugs with regulatory approval. This resource stock has been continually refreshed through R&D activity, which essentially consisted of testing thousands of chemical entities for their efficacy in treating a range of illnesses. Drug companies had built up learning dynamic capabilities through the establishment and development of teams of specialist researchers, and other groups who were skilled in the extensive phases of testing required for regulatory approval. In the 1980s and early 1990s a series of major mergers and acquisitions led to consolidation in the industry (e.g. Glaxo merging with Smith Kline, who earlier combined with Beecham). But in the mid 1990s, GSK acquired hundreds of much smaller firms, many of whom have never sold any products, and who operate with quite different technologies and science

bases e.g. biotech firms. More recently, GSK have embarked on a series of divestments, and outsourced activities traditionally performed in-house.

So the original learning processes of R&D have been augmented by three different phases of reconfiguration. The first phase of mega-mergers involved similar firms combining, the second phase consisted of the acquisition of dissimilar firms e.g. much smaller businesses, with different technologies, and the most recent phase consisting of restructuring and outsourcing activities. Again, this is *de facto* evidence of regenerative dynamic capabilities triggered by performance problems caused by the declining value of the existing resource base as products come off patent. The existing R&D dynamic capabilities were insufficient in and of themselves to maintain or indeed expand the stock of resources. The shift into biotech acquisitions was triggered by the realisation that the pipeline of new chemical entities was drying up, with major pharmas restricted to the introduction of only one or two new drugs per year. Generally, pharmaceutical companies are operating in a more challenging environment due to high competitive rivalry, the price sensitivity of healthcare providers and stricter ethical and efficacy standards.

So we have evidence that dynamic capabilities in IGR and GSK have evolved over time, and we can infer that the processes which caused these adjustments and augmentations in capability fit our definition of regenerative dynamic capabilities. To recap, regenerative dynamic capabilities do not directly create or reconfigure resources. They work indirectly by embedding new dynamic capabilities into the firm.

Interestingly, this could mean that these regenerative dynamic capabilities may be more generic than dynamic capabilities, as dynamic capabilities operate directly on the resource base of the firm and thus need to be sensitive to the specifics of the firm's context and its extant resource stock (Wang and Ahmed,

2007). As already stated dynamic capabilities are embedded within the firm, are path dependent and hence most likely to be firm specific (Teece *et al.*, 1997). While one can argue that this view is not shared by Eisenhardt and Martin (2000), who state that dynamic capabilities are equifinal, substitutable and fungible, we would suggest that if dynamic capabilities are not sensitive and appropriately adapted to the current resource stock, the specific context, culture and history of the firm, they may not facilitate in the creation of valuable resources, and there is even a risk that their inappropriate deployment may actually destroy subtle sources of advantage. Regenerative dynamic capabilities, changing the way a firm refreshes its resource base, are one step removed from the resource stock itself and may therefore be effective across specific firm contexts.

Further, as a firm has developed its dynamic capabilities over time through learning processes (Zollo and Winter, 2002), which are reinforced and embedded through repetition (Nelson and Winter, 1982), it may be difficult for the incumbent management to develop a new set of dynamic capabilities; breaking the 'path' or culture within the firm may prove to be difficult. Indeed it is arguable that most organizational learning is often similar to what has been learnt before (Argyris and Schon, 1978) and managers may find it hard not to rely on existing dynamic capabilities, to over-generalise from past experience or to rely on their existing mindset (Argote, 1999; Eisenhardt and Martin, 2000). Managers may need to seek new ways to operate, to break the old ways and refresh their dynamic capabilities (Zahra *et al.*, 2006). These two arguments that regenerative dynamic capabilities may be generic and may also be difficult to develop within the firm (Teece *et al.*, 1997), leads us to the issue of whether regenerative dynamic capabilities need to be

embedded within the firm and if not can they qualify as belonging to the 'realm' of dynamic capabilities?

Regenerative dynamic capabilities and embeddedness

While it can be argued that regenerative dynamic capabilities, as any capability, can be developed through time, we may want to address whether, when there is simply no time for organizational learning and investment processes to take place to develop and deploy them (Helfat *et al.*, 2007; Zollo and Winter, 2002), these regenerative dynamic capabilities could not be sourced from outside the firm. If this were the case then these regenerative dynamic capabilities would not be embedded within the firm. This raises the issue of whether imported regenerative dynamic capabilities would qualify as a dynamic capability which "must contain some patterned element" (Helfat *et al.*, 2007, p. 5), i.e. that must be repeatable, it cannot be a one-off incident of ad hoc problem solving (Helfat *et al.*, 2007).

So where might regenerative dynamic capabilities be imported from? In a corporate, multi-strategic business unit (SBU) structure they could be located at the corporate centre. Then, as and when regenerative dynamic capabilities are required within specific SBUs, the centre could appropriately deploy them to assist the SBU in regenerating its extant dynamic capabilities. These dynamic capabilities could also come from outside the corporation altogether. For instance a new CEO could be brought in, who has experience of transforming other firms, or strategic change consultants could be deployed. While being new to the firm these capabilities, which would impact on the firm's current set of dynamic capabilities, would have been exercised before by either the incoming leadership, the corporate centre or external consultants, so for them this would be part of their normal role; this *is* their day job.

The new CEO, for instance, may have successful experience of identifying acquisition targets, successfully acquiring and integrating them. For this CEO what they do within the firm is habitual, capabilities that they may have previously honed in different firms and contexts, and therefore these are not one-off performances. So for the CEO this is nothing new, only the context is new, but for the firm this would consist of a change in their dynamic capabilities, i.e. an instance of the exercise of regenerative dynamic capabilities.

Significantly, even if imported from outside the firm we can argue that these regenerative dynamic capabilities fulfil the 'repeatability' criteria, as they can be stable and routinised processes: Feldman and Pentland (2003) argue that an organizational routine can be decomposed into two components: the ostensive aspect of the routine, that is the structure or abstract understanding of the routine, and the performative aspect, that is the actual performance of the routine, "it is the routine in practice" (Feldman and Pentland, 2003, p. 101), it is what brings the routine to life and hence the performance may be novel each time. Taking Feldman and Pentland's (2003) examples of a firm's recruitment process, a firm will recruit many employees, so at an abstract level the activity of recruitment is routine and is repeated; however how the hiring process is actually performed, the performative aspect, may differ on each occasion. Those notions of ostensive and performative aspects of the routine can also be related to Antonacopoulou's (2006) distinction between *practice* and *practise*. Practice relates to the ostensive aspect of the routine, practise to the performative: "the same practice has always the potential to be both performed and represented in diverse ways" (Antonacopoulou, 2006, p. 16). We can apply this to the regenerative dynamic capabilities construct and as a result argue that regenerative dynamic capabilities pass the repeatability test. While

regenerative dynamic capabilities may look different in action (e.g. the strategy consultant or hired CEO will apply their capabilities on a different set of dynamic capabilities each time they move from firm to firm), its structure will likely remain the same, and therefore it is repeatable as an ostensive routine.

Discussion

Finally, before concluding, we would like to comment on whether dynamic capabilities are necessarily linked to positive impacts on firm performance. In our paper, similar to Helfat *et al.* (2007), we have decoupled the notion of dynamic capabilities and performance and do not imply that dynamic capabilities automatically lead to advantage. It is valuable, rare, difficult to imitate and non-substitutable resources that generate rents and contribute to the firm's super normal profit by being involved either in delivering product advantages perceived by customers or by conferring process advantages that result in lower unit costs (Bowman and Ambrosini, 2003). In other words, the resource base is directly linked to rents, but dynamic capabilities are one step beyond (and regenerative dynamic capabilities two steps beyond) these rent generating activities. Incremental and renewing dynamic capabilities impact on the resource base, and regenerative dynamic capabilities in turn affect incremental and renewing dynamic capabilities.

The impact of dynamic capabilities on ultimate firm performance may be negative, the dynamic capabilities may change the resource base but this renewal may not be in line with the environment. This means following Zahra *et al.* (2006) that while regenerative dynamic capabilities may allow a firm to change its dynamic capabilities, it does not ensure that the organization will be successful or even survive.

An example of where using regenerative dynamic capabilities did not result in success until the firm had experienced several failed attempts to adjust its dynamic capabilities is Marks and Spencer (M&S). Historically M&S was highly successful, but in the 1990s it suffered from decreasing profits and market share. M&S had many problems. Notably it displayed both a lack of understanding of its customers and lack of reaction to their shifting needs, and it faced a significant challenge from a number of its competitors. This would suggest that the extant set of dynamic capabilities which M&S used was no longer appropriate. To counter this, its board employed a succession of new CEOs. The first three CEOs had similar ways of changing M&S. Their changes resulted in leveraging the M&S brand, for example the creation of its 'Simply Food' range or the '&More' loyalty card. Despite these changes of leadership the situation worsened.

The M&S board then hired Stuart Rose. In terms of explaining regenerative dynamic capabilities, here we see that in hiring yet another CEO the board are again repeating their actions; this is the ostensive aspect of the regenerative dynamic capability. The performative aspects of the regenerative dynamic capability are Rose's actions. The regenerative dynamic capability level actions that Rose took were essentially learning and replication. He had gathered knowledge and experience from the previous positions he held at a series of high-street retailers (for example, he had transformed the Arcadia group). He also had previously worked at M&S and had studied the decisions and resulting outcomes of the actions introduced by past CEOs. All this allowed Rose to create a new mix of dynamic capabilities. M&S stopped relying on only leverage to refresh its resource base. He changed the processes of buying, introduced new collaborative practices between M&S' buyers

their suppliers, and challenged many 'sacred cows' associated with the embedded incremental dynamic capabilities.

It has been argued that success tends to lead to complacency, and that if managers perceive their firm to be successful, and believe it has been so for a while, they are unlikely to change their ways of doing things or change their assumptions (Johnson, 1988; Smith *et al.*, 2001; Zahra *et al.*, 2006). This may suggest that regenerative dynamic capabilities are unlikely to be employed in such circumstances, as managers may not be able to envisage how their current set of dynamic capabilities could or indeed why they should be changed. "it clearly isn't broke, so why fix it?" (Tushman and Romanelli, 1985). Thus the deployment of regenerative dynamic capabilities will also depend on how often managers perceive the need for this order of change, and this perception may be based on either external environmental characteristics, such as competitive rivalry, product life cycles etc. or on personal characteristics, such as dissatisfaction towards the current level of performance or a personal propensity towards risk taking. This reinforces Teece *et al.*'s (1997) framework of processes, position and paths, and Antonacopoulou's (2006) and Feldman's (2004) argument, that there is a constant connection between micro and macro contexts. Dynamic capabilities are situated. They are situated in the environment, the paths the firm has followed, what people within the firm have done and are doing etc. These are all at play in the development of dynamic capabilities, and history of the firm undoubtedly influences the presence and performance of activities.

Finally, we have argued that perceptions of the need for change can be formed from managerial awareness and understanding of the external environment, and from other internally located stimuli, including perceptions of performance and

personal motivations to effect change. Adopting such a perspective enables us to address circumstances where the 'appropriate' dynamic capabilities have not been applied i.e. where managers inappropriately diagnosed the type of change needed. For instance, Johnson (1988) refers to 'strategic drift' as a situation where managerial perceptions of the pace of change in the environment are out of line with the actual external changes taking place, leading to insufficient internal adaptation and declining firm performance. Managers may perceive the need for radical changes to the firm's operations, but acting on it may actually destroy resources. As such we suggest, along with others (e.g. Mezias and Starbuck, 2003), that managers may inappropriately diagnose the degree of change required. For instance managers may incorrectly identify stability in their environment. They may persist in applying improvement routines, effectively screening out or re-interpreting any signals that might suggest more radical changes might be required. Managers may prefer the predictability involved in repeating past behaviours, even where these may be embedding and creating core rigidities (Leonard-Barton 1992).

As argued regenerative dynamic capabilities are likely to be applied where managers perceive substantial dynamism in their environments. These perceptions may well be shaped by perceived discontinuities in the market environment, or by significant changes to the internal environment, but there may be a disconnect between the perceived environment and the actual environment, and we could envisage managerial over- and under-reactions with respect to regenerative dynamic capabilities. Over-reaction would occur where managers perceive the need for radical changes to the extant dynamic capabilities that are not actually warranted. The effects are likely to be the destruction of parts of the resource base, and/or a significant disturbance to extant change processes that would consume unnecessary

resources and energy. Under-reaction would probably lead to slow or rapid decline depending on the actual degree of turbulence in the external environment.

In summary we can propose that where managers underestimate environmental dynamism, there is a risk of strategic drift (Johnson, 1988), where the firm fails to refresh its resource stock at an appropriate pace, or to the required extent. Alternatively, managers may look to change the resource base at a pace not warranted by the actual degree of dynamism in the environment. This could have positive performance outcomes, if, as a consequence of these proactive changes, the firm gains an advantage over competitors, and possibly re-defines the basis of competing. However, there is a possibility that excessive change would result in the destruction of valuable resources, or indeed in the case of regenerative dynamic capabilities, the destruction of valuable dynamic capabilities.

Whatever the situation they perceive, for managers, knowing how to change and extend both their resource base and their dynamic capabilities is critical. Hence we can argue that trying to better understand and develop the notion of dynamic capabilities matters for both practitioners and academics alike. This leads us to argue that awareness of the three levels of dynamic capability should provoke debate within top management teams. Specifically, managers could at least share their perceptions about the extent of environmental dynamism they perceive, and where there are differences in perception, this might encourage some important conversations, and maybe a search for further information to resolve some of these differences. Managers could also try to identify the nature of the extant dynamic capabilities, and then determine whether these dynamic capabilities are appropriate to enable the firm to prosper in the perceived environmental context. Finally, should

any adjustment in dynamic capabilities be required, managers could think how to develop them.

Conclusion

Before we conclude our paper we highlight a few areas for future research. As noted by many authors (see for example Aragon-Correa and Sharma, 2003) the challenge of any conceptual research is to develop empirical measures. We believe this is the next logical step for the ideas set out in this paper. We propose that the three levels of dynamic capability could be researched empirically to find evidence to give them greater depth and allow for more understanding of the concepts. It would be interesting to study the use of regenerative dynamic capabilities for instance in younger versus more established firms, whether managerial perceptions of dynamism varies across industries or if the use of different types of dynamic capability varies across industries. In addition we also think there is value in conceptually developing the paper, for example by extending it further into the learning or change literature, this should help build on our descriptions of the constructs we have developed.

In closing, we have argued that there were three main levels of dynamic capabilities, based on managerial perceptions. These three levels have allowed us to further open the 'black box' associated with comprehending dynamic capabilities.

If, as argued, firms must adapt to and exploit changes in their business environment and even to provoke change (Eisenhardt and Martin, 2000; Helfat *et al.*, 2007) it is vital that we place managers at the centre of the discussion on dynamic capabilities. We have done so by considering managerial perceptions of environmental dynamism, as managers base their decisions on their perceptions.

Also, with the notable exception of Eisenhardt and Martin (2000), the dynamic capability construct has only been applied to a dynamic environment. By distinguishing between incremental dynamic capabilities, which are used to continually improve the resource base, and renewing dynamic capabilities, which are used to adjust the mix of the extant resource stock, we have shown that the basic concept of dynamic capability could be decomposed into two levels, according to perceptions of stability or dynamism in the environment. Then, following Winter's (2003) higher order argument and Helfat *et al.*'s (2007) comment that some dynamic capabilities can modify dynamic capabilities, we have proposed that firms may require a third level of dynamic capabilities: regenerative dynamic capabilities. Those are applied to regenerate the current set of dynamic capabilities and would be used when managers perceive a disruption to their environment that renders the current set of capabilities inappropriate. A firm needs regenerative dynamic capabilities if the dynamic capabilities it has in place are no longer relevant, or do not allow the firm to "achieve new resource configurations as markets emerge, collide, split, evolve and die" (Eisenhardt and Martin, 2000, p. 1107).

We have also explained that dynamic capabilities do not have to be developed internally as asserted by Helfat *et al.* with Maritan (2007). They can be sourced from outside the firm. However using Feldman and Pentland's (2003) work on ostensive and performative routines, we have shown that we have adhered to Helfat and Peteraf's (2003) requirement that dynamic capabilities must be repeatable and embedded. We have also explained and discussed that managerial perceptions of their internal and external environment were central to the development and deployment of all types of dynamic capabilities and that it was plausible that these perceptions may be sometimes inaccurate and consequently dynamic capabilities

may be applied inappropriately. Therefore the performance of dynamic capabilities would not in itself lead to performance improvements; these improvements would occur only where there was a matching of perceived dynamism and the 'real' degree of dynamism, and only where the firm actually had the required order of dynamic capability, would we expect a positive performance outcome.

Finally, Zahra *et al.* (2006, p. 917) report that "the emergent literature on dynamic capabilities and their role in value creation is riddled with inconsistencies, overlapping definitions, and outright contradictions. Yet, the theoretical and practical importance of developing and applying dynamic capabilities to sustain a firm's competitive advantage in complex and volatile external environments has catapulted this issue to the forefront of the research agendas of many scholars". We hope this paper brings us a step closer to clarifying definitions of dynamic capabilities.

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Figure 1: The three levels of dynamic capabilities

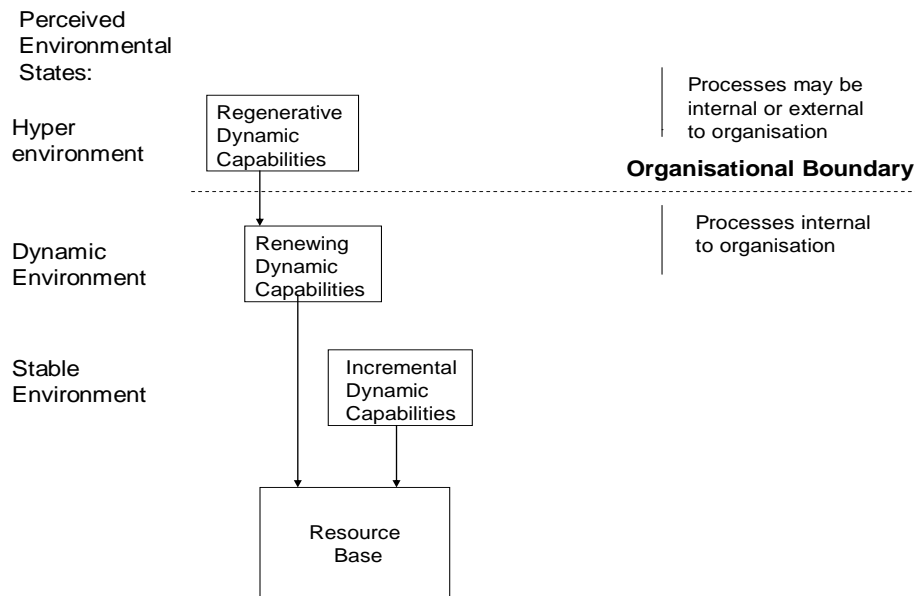


Table 1: Comparing typologies

Collis (1994)	Danneels (2002)	Winter (2003)	Zahra et al. (2006)	Our paper
First category	First order capabilities	Zero level capabilities	Substantive Capabilities	Resource base
Second and third categories	Second order capabilities	First order capabilities	Dynamic capabilities	Incremental dynamic capabilities Renewing dynamic capabilities
Meta capabilities		Higher order capabilities		Regenerative dynamic capabilities*
<i>Ad infinitum</i> meta capabilities				

* Regenerative dynamic capabilities are a form of meta-capabilities but are defined precisely as being dynamic capabilities impacting on dynamic capabilities, rather than the more general definition that they are capabilities “of the ‘learning to learn’ variety” (Collis, 1994, p. 143).