# Dynamic Capabilities and Innovation Capabilities: The Case of the 'Innovation Clinic'

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***Abstract***

*In this explorative study, we investigate the relationship between dynamic capabilities and innovation capabilities. Dynamic capabilities are at the core of strategic management in terms of how firms can ensure adaptation to changing environments over time. Our paper follows two paths of argumentation. First, we review and discuss some major contributions to the theories on ordinary capabilities, dynamic capabilities, and innovation capabilities. We seek to identify different understandings of the concepts in question, in order to clarify the distinctions and relationships between dynamic capabilities and innovation capabilities. Second, we present a case study of the 'Innovation Clinic' at a major university hospital, including four innovation projects. We use this case study to explore and discuss how dynamic capabilities can be extended, as well as to what extent innovation capabilities can be said to be dynamic. In our conclusion, we discuss the conditions for nurturing 'dynamic innovation capabilities' in organizations.*

***Keywords:*** *dynamic capabilities; innovation capabilities; service innovation; healthcare.*

## INTRODUCTION

In this paper, we seek to understand dynamic innovation capabilities, as compared (and related) to dynamic capabilities and innovation capabilities, respectively. A long research tradition has focused on organizations' resources

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as sources and limitations of growth, competitive advantage and innovation (e.g., Penrose, 1959; Bower, 1970; Wernerfelt, 1984; Barney, 1991). Extending this tradition, capabilities, rather than resources or products, have been suggested to explain the challenge of achieving superior fit with shifting environments (Teece, Pisano & Shuen, 1997). Eisenhardt and Martin (2000) explicitly challenged the resource-based view, arguing that there are identifiable processes that can explain the nature of competitiveness. Later research on capabilities has focused on how higher-order routines constitute dynamic capabilities (Winter, 2003). To meet the demands from new markets, revolutionary changes in technology or new business models, firms need to renew themselves (Chakravarthy & Doz, 1992) and be innovative. There have been a number of theoretical studies of dynamic capabilities (e.g., Eisenhardt & Martin, 2000; Teece et al., 1997; Teece, 2007; Teece, 2014), but one of the key remaining challenges is to understand the relationship between dynamic capabilities and innovation capabilities, as pointed out by Breznik and Hisrich (2014). The relationship between dynamic capabilities and innovation capabilities shows overlaps, inconsistencies, and contradictions (Breznik & Hisrich, 2014, p. 368,). Thus, our research questions are: How are capabilities related to innovation? And, relatedly, what are the premises for dynamic innovation capabilities, and how can they be developed?

In this paper, we will use Teece's (2014) definition and operationalization of dynamic capabilities into *sensing* opportunities to meet customer needs, *seizing* opportunities to mobilize resources and capture value, and continued renewal through *transformation*. There are few studies of innovation capabilities in practice, and our aim is to use a case study of an innovation unit at a major university hospital as a vehicle to explore potential differences and similarities between dynamic capabilities and innovation capabilities.

We do this by reviewing and discussing some central contributions to the literature on capabilities, dynamic capabilities and innovation capabilities, while seeking to clarify the distinctions between the terms. We then present a case study of an 'Innovation Clinic' at a large university hospital. Towards the end of the paper, we discuss the potentially dynamic aspects of innovation capabilities and why they are important in large research-oriented service organizations.

## LITERATURE REVIEW

### An outline of dynamic and innovation capabilities

*Capabilities*

Capabilities can be understood as what makes firms different among their competing and partnering organizations. For example, different car producers are all participants in the same industry, but they show very different performance. The variation between firms' performance, then, cannot be explained by the industry itself (Rumelt, 1991; Porter & McGahn, 1997). Rather, this variation can be explained by firm-specific differences due to different strategic capabilities, as the firms deploy resources and competences (Johnson et al., 2014). There are important distinctions between capabilities and resources (Amit & Schoemaker, 1993), as it is not sufficient to control tangible or intangible resources for long-term survival; the ability to configure and reconfigure resources over time is also needed. Penrose (1959) discussed the challenge and limitations of growth in terms of management capacity to hire, train and implement new management in an organization. Firms cannot easily acquire or get rid of specialized resources, and specialization tends to create a stickiness effect. For instance, time and effort must be used to align resources after acquisitions or mergers. Leonard-Barton (1992) discusses the challenges regarding how core capabilities also create core rigidities, in her analysis of product development teams. When investing in and learning certain capacities, firms will also find that it is costly to change focus, and, therefore, specializing in certain capabilities will create rigidities.

There are several descriptions of capabilities, not necessarily 'dynamic' capabilities, in the literature. This is a good starting point to understand dynamic capabilities, innovation capabilities, and dynamic innovation capabilities – the three core concepts we will use in this paper. Amit and Schoemaker (1993) argue that capabilities can be functional and rooted in specific areas of the firm. Teece, Pisano and Shuen (1997, p. 512) use the term 'operational' capabilities to describe the ordinary routines of Southwest Airlines that were difficult for competitors to copy. Later, Helfat and Winter (2011) used the terminology of operational and dynamic capabilities to describe first- and second-order capabilities. Ordinary capabilities are explained by Winter (2003) as the capacity to fix ad-hoc problems or challenges. This type of capability is not dynamic but is only suited for situated problem solving. Thus, these are not capabilities enabling long-term or higher-order changes in the organization. For further use in this paper,

we will use the simple term "capabilities" interchangeably with operational, functional or ordinary capabilities as discussed in the literature.

*Dynamic capabilities*

We define dynamic capabilities, in line with Teece et al. (1997) and Teece (2007), as not only direct production or development of market offers but also a higher-order capability to build, integrate and reconfigure operational capabilities. Capabilities have two intrinsic qualities (Helfat & Peteraf, 2003, p. 999), those that perform individual tasks and those that coordinate individual tasks. In order to try to discuss what makes capabilities dynamic, we will look at some of the advances in this research stream. Dynamic capabilities can be understood, for example, by observing industry dynamics over time. Capabilities can be easy to define in theory but quite hard to identify in practice. Therefore, we offer an example from the music player and camera industry in order to provide an idea of the kind of role dynamic capabilities actually play in practice. Sony was once a market leader in portable music, first selling portable cassette players, then establishing itself in the market for portable CD players and, later, in the mini-disc market. New technology came with the MP3 format to dominate the industry. However, Sony did not capture any significant part of the MP3 market for portable music, as Apple and others came in to dominate the market. However, Sony moved on to use its capabilities to establish itself in the camera market, and by 2014 they had captured 13% of the high-end market for cameras with changeable lenses (Petapixel.com, 2015), which had earlier been dominated by firms such as Nikon, Canon and Olympus. From this example, we can gain insight into how resources, competences, R&D and market insight, as well as managerial talent are deployed in different areas over time, and we can understand from a practical point of view what constitutes dynamic capabilities. This example also illustrates the challenge of understanding the nature of dynamic capabilities in time and space (e.g., over time and in several markets).

One of the early contributions to our insight on the nature of dynamic capabilities originates from Collis (1994), who used the term 'organizational capabilities', arguing that dynamic capabilities are simply capabilities that make it possible to change ordinary capabilities over time. According to Collis, dynamic capabilities are subject to three challenges; erosion, substitution and learning about higher-order capabilities over time. Teece et al. (1997, p. 516) defines dynamic capabilities, with reference to Leonard-Barton (1992), as *"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"*. Eisenhardt and Martin (2000, p. 1105) argue that dynamic capabilities consist of a set of specific processes, such as product development, strategic decision making and alliancing. They argue that these capabilities are identifiable and typically have similar characteristics across firms, in terms of basic processes and activities, but they are not equal across industries. The challenge with Eisenhardt and Martin's (2000) view on dynamic capabilities is that they become just another set of processes, not describing how capabilities are renewed over time. Another aspect is how Eisenhardt and Martin (2000) identify a more active managerial role than, for instance, Teece et al. (1997) do. While Teece et al. (1997) rely more on routines and procedures, Eisenhardt and Martin (2000, p. 1117) argue that competitive advantage comes from how managers use dynamic capabilities, rather than from the capabilities themselves.

Winter (2003) suggests a useful way of distinguishing between ordinary capabilities and dynamic capabilities; however, Helfat and Winter (2011, p. 1245) argue that it is difficult to make a distinction between dynamic and operational capabilities. We can only know afterwards where the change is coming from, the size of the change, and what effects the change will have. For firms involved in R&D, there might be spill-over effects on production, as small improvements in a fabric or substance might alter the production process itself. Thus, it is difficult, a priori, to tell the difference between dynamic and operational capabilities, because one could lead to the other and vice versa. This is one of the reasons why there is a need for longitudinal studies of capabilities in time and space.

**Table 1.** Four different definitions of dynamic innovation capabilities

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| Teece, Pisano, and Shuen (1997, p. 516): "We define dynamic capabilities as 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." |
| Eisenhardt and Martin (2000, p. 1118): "Dynamic capabilities include well-known organizational and strategic processes like alliancing and product development whose strategic value lies in their ability to manipulate resources into value-creating strategies. Although idiosyncratic, they exhibit commonalities or 'best practice' across firms….They evolve via well-known learning mechanisms." |
| Winter (2003, p. 991): "One can define dynamic capabilities as those that operate to extend, modify or create ordinary capabilities." |
| Helfat, Finkelstein, Mitchell, Peteraf, Singh, Teece, and Winter (2007, p. 4): "A dynamic capability is the capacity of an organization to purposefully create, extend or modify its resource base." |

As can be seen in Table 1, there are two major, and somewhat different, perspectives on capabilities. Eisenhardt and Martin (2000) argue that dynamic

capabilities can be understood as routines of "best practice" and, further, that capabilities must be robust in order to handle fast changes. Firms operating in high-velocity environments need to rely on heuristics for changes, quickly developing new combinations of resources when needed. Teece (2014), on the other hand, argues that Eisenhardt and Martin's (2000) concept of 'dynamic capabilities' is quite similar to Teece et al.'s (1997) concept of 'ordinary capabilities'. Eisenhardt and Martin (2000, p. 13) argue that dynamic capabilities are simply "best practices" and are shared among several firms in the market. Teece (2014, p. 332) describes ordinary capabilities in terms of technical efficiency in business functions, based on the ability to buy or build learning. An ordinary capability can be based on a best practice, which is not very difficult to imitate, such as when managerial emphasis is placed on cost control. In terms of modus operandi, ordinary capabilities involve aiming at doing things right and efficiently, with technical fitness as a result.

There are several literature reviews discussing the nature and the origins of dynamic capabilities (Ambrosini et al., 2009; Breznik & Hisrich, 2014; Easterby-Smith, Lyles & Peteraf, 2009; Helfat et al., 2007; Wang & Ahmed, 2007). A majority of these studies of dynamic capabilities treat Teece et al. (1997) as the original definition of dynamic capabilities. The purpose of dynamic capabilities is to achieve congruence with business opportunities and user needs by learning, based on signature processes that are difficult to imitate (Teece, 2014). As an operationalization for analytical purposes, Teece (2007, p. 12319) argues that *"dynamic capabilities can be disaggregated into the capacity (1) to sense and shape opportunities and threats, (2) to seize opportunities, and (3) to maintain competitiveness through enhancing, combining, protecting, and, when necessary, reconfiguring the business enterprise's intangible and tangible assets"*. Hence, we will use the dimensions of sensing, seizing and transforming as analytical dimensions in this paper. The modus operandi focuses on doing the right things through entrepreneurial action, and the goal is to create evolutionary fitness through innovation. As Teece (2014) argues, there is a potential for focusing on the nature of innovation within the dynamic capabilities literature in general, and innovation capabilities in detail, as we will do in the next section.

### *Innovation capabilities*

The concept of innovation capabilities is somewhat confusing. On the one hand, capabilities in themselves involve routines – and specifically, as defined by Winter (2003), routines for daily business – while dynamic capabilities are routines for higher order changes or adaptation. In this respect, dynamic capabilities have covered most of the themes discussed in the innovation

literature, at least at a strategic management level of analysis. As described by Eisenhardt and Martin (2000), dynamic capabilities are discovered in product development processes, in addition to strategic decision making, integrating resources, and acquisitions. Teece (2007, p. 1321) describes the role of the entrepreneur, as not only adapting to, but actually shaping, the environment. With this in mind, dynamic capabilities involve product development as well as entrepreneurial action, and thus innovation capabilities are already covered by the contributions of dynamic capabilities. However, Wang and Ahmed (2007, p. 37) use the term 'innovation' to describe the nature of innovation capabilities, in addition to adaptive and absorptive capabilities, as the three main forms of capabilities that exist. Teece (2007) argues that selecting products and business models is part of the micro-foundations of dynamic capabilities. These two core business processes are central to innovation. On the other hand, we can see that dynamic capabilities are more than only innovation capabilities, as discussed by Helfat and Peteraf (2011, p. 1249), as, for instance, product development may also relate to existing business. From the literature on strategic management, we can argue that innovation and innovation capabilities refer to an important part of dynamic capabilities; in fact, it is one of the central entities of dynamic capabilities.

On the other hand, if we look at studies on innovation and search for the connection to innovation capabilities, this might reveal interesting insight into use of the terminology. We conducted a literature review on innovation capabilities, analyzing contributions using the terms "innovation" and "capabilities" together. In doing so, we discovered traces back to Lawson and Samson's (2001) study of innovation management. They developed a construct from a theory review and a case study of Cisco Systems, consisting of seven elements: vision, competence base, organizational intelligence, creativity, idea management, organizational structures and systems, culture and climate, and management of technology. They portray innovation capability as a meta-capability to achieve outstanding innovation performance. Lawson and Samson (2001, p. 380) state that innovation capability *"is proposed as a higher-order capability, that is, the ability to mould and manage multiple capabilities. Organisations possessing this innovation capability have the ability to integrate key capabilities and resources of their firm to successfully stimulate innovation"* (i.e. dynamic capability).

Studies of innovation capabilities are mainly concerned with either industry- or firm-specific factors. Several studies focus on industries, geographical areas or more general development of innovation capabilities in different regions. Guan and Ma (2003) investigated innovative capabilities and export performance among Chinese firms, concluding that export growth was closely related to the total improvement of innovation capability dimensions,

except for manufacturing capabilities. However, the core innovation assets (a set of R&D, manufacturing and marketing assets) alone did not lead to sustainable export growth. There are also studies of technology and innovation capabilities (Yam et al., 2004; Wang et al., 2008), focusing on how firms cope with uncertainty. Several studies focus on innovation capabilities in small and medium-sized enterprises (SMEs). Keskin (2006) reported a positive relationship between market orientation, learning and innovation capabilities in SMEs. Forsman (2011) examined innovation patterns in SMEs and demonstrated that manufacturing and service firms were not very different, instead finding larger differences between sectors (Forsman, 2011, p. 748). However, our focus in this study is on organization-specific factors, not industry-wide application and development of innovation capabilities. Hertog et al. (2010) developed a conceptual framework for capabilities to manage service innovations and specified six dynamic service innovation capabilities – namely, signaling user needs and technological options, conceptualizing, (un-)bundling capability, co-producing and orchestrating, scaling and stretching, and learning and adapting. Terziovski (2007) studied how innovation capabilities can be developed and exploited, arguing that the essential building blocks for innovation capabilities are collaboration and knowledge transfer. Oskaya (2011) and Oskaya et al. (2015) argued that innovation capabilities mediate the relationship between knowledge and product innovation, as well as the relationship between inter-functional cooperation and product performance. As a critical remark to the studies of innovation capabilities, few of these studies relate their concepts to the *long-term* survival of the organizations at hand. To conclude, the studies on dynamic capabilities are related to the overall strategy of the firm, while studies on innovation – utilizing the innovation capability terminology, take a more functional stance towards innovation. In both areas, innovation and innovation capabilities play an important role, and to some extent they overlap, but from a different starting point. Studies on dynamic capabilities consider the overall strategic implications, while studies using the terminology of innovation capabilities look at innovation as a driver for performance.

## *Clarifying the concepts of dynamic capabilities and innovation capabilities*

With the preceding discussion in mind, how can we conceive of the relationship between dynamic capabilities and innovation capabilities? Helfat et al. (2007, p. 4) define dynamic capabilities as *"the capability of an organization to purposefully create, extend and modify its resource base"*, and above we explained that innovation capabilities could be seen as potentially

dynamic or non-dynamic (Teece et al., 1997). According to these authors, typical innovation activities, such as product development and R&D, are not necessarily dynamic if they do not contribute to the long-term capacity to adapt to changing environments. Hence, innovation capabilities may in fact operate under relatively stable environmental conditions, or they may lack the features necessary to aid in reinterpreting and reconfiguring knowledge and resources according to changes and instabilities in the environment, not to mention the ability to partake in shaping the environment. On the other hand, as emphasized by Lawson and Samson (2001) and Terziowski (2011), innovation capabilities may be highly dynamic, in that they contribute to radical reinterpretation, recombination and transformation of the organization's knowledge and resources in ways that influence and adapt to changing environments. Furthermore, this way of looking at innovation capabilities as potentially dynamic is fully within the scope of Teece and colleagues' (1997; 2007; 2014) version of dynamic capabilities, emphasizing the sensing, seizing and transformation of *capabilities* over time. In other words, it is the *capability of transforming capabilities*, including innovation capabilities, over time, that qualifies as 'dynamic capabilities'. Hence, in order to study the relationship between dynamic capabilities and innovation capabilities empirically, we will utilize the framework of Teece (2014) to analyze and discuss the development of dynamic innovation capabilities in practice.

## RESEARCH METHODS

We have conducted a process-oriented single case study of an innovation unit in a big organization in order to explore complex relationships over time (Hoholm & Araujo, 2011; La Rocca et al., 2017). Our case study analysis has been characterized by abductive back-and-forth movements between empirically rich descriptions, analysis, and theory development (Dubois & Gadde, 2002; 2014). It is challenging to study capabilities, and dynamic capabilities are best understood across time and space. Hence, we conducted a longitudinal case study of the Innovation Clinic at a major University Hospital, including a series of their innovation projects. The case was chosen for its potential to enable an exploration of dynamic innovation capabilities in practice. The data are based on retrospective constructions (documents and interviews) as well as prospective process observations by the third and the fourth authors. Numerous field interviews, field observations and field talks were done by these authors throughout the whole period. At the end of each innovation project, the Innovation Clinic wrote case evaluation reports

in order to develop their methods and capacity to (1) document the value of, and the barriers to, innovation projects; and (2) contribute to actual and important innovation processes. These project reports were exploited as important data materials in our study, documenting aspects of the process, as well as methods and routine development. In addition, the successive development of innovation practices across the projects was analyzed to identify the Innovation Clinic's learning about innovation management over time. The first author was included at a later stage, contributing to the theoretical and analytical frameworks, and to the discussion of findings, with the critical gaze of the 'outsider'. The second author contributed empirically, while not being a participant in any of the innovation projects, as well as to the analysis and discussion of findings. In our experience, the authors contributed a productive mix of different views and experiences to create new insights. The purpose of the study was to develop knowledge of the development of dynamic innovation capabilities at the organizational level. Thus, we chose to describe a selection of innovation projects that we found to demonstrate the emergence of new capabilities across time.

In our analysis, we identified major happenings, meetings, conflicts and decisions made throughout the different projects reported in this paper. Four innovation cases were chosen from a wider pool of 11 project reports, as they could most clearly illustrate the line of development over time, emphasized by the theoretical framework of this paper. The study covers the time period from 2007 to 2016. Hence, this paper benefited from a longitudinal case study (Hoholm & Araujo, 2011), while coping with the challenges of 'nativism' (Gioa & Chittipeddi, 1991) through distance, discussion and ideas from the more 'external' authors. We used an abductive approach, moving back and forth between analysis and theorizing (Dubois & Gadde, 2002; 2014), in order to get a better analytical grip on how dynamic innovation capabilities may be developed. The results of our study are found at the level of 'analytical generalizations', encouraging further research to complement our insights across cases and contexts (Dubois & Gadde, 2002).

## A case study of innovation capabilities development in a hospital

We will now direct our focus to describe the efforts of the "Innovation Clinic" (IC) at a major Norwegian university hospital, including their facilitation of four different innovation projects. We analyze how the IC and each of the four innovation projects may be said to contribute to the development of dynamic capabilities and innovation capabilities in the hospital. The studied university hospital has more than 20,000 employees and serves the population of a major city and its surrounding area, as well as the national

population in some specialized medical fields. Overall, the university hospital is one of the larger hospitals in the European context. Hospitals have been considerably knowledge-intensive for decades, and their practices are increasingly knowledge-based, in line with the emergence of the medical sciences. However, while medical personnel at this hospital published around 350 scientific papers in 2007, only one innovation was reported. The organization found it to be more challenging to develop and implement innovations, which often required organizational and institutional changes, than to develop research-based medical knowledge closely related to daily medical practices. Hence, the Innovation Clinic was established in 2007 to develop innovations within and at the borders of the university hospital. There seemed to be a large potential to improve dynamic capabilities and support a stronger development of innovation capabilities in the organization, particularly in terms of services and organizational aspects. The Innovation Clinic formulated four different aims in the startup phase: (1) With top-down support, build bottom-up infrastructure for innovation; (2) investigate and document the economic value of innovations; (3) communicate and document innovation benefits; and (4) establish an innovation network at the national level. Through the early phase, a series of 11 different innovation projects were used instrumentally to provide insight and experience in documenting value and benefits to employees, patients, their families, hospitals, the healthcare sector, and society at large. This strategy was considered to be important for getting the attention of decision makers as well as the whole organization. Through close contact with several clinics and practices at the hospital, the Innovation Clinic developed methods to promote and facilitate healthcare innovation. They also worked to develop capacity for guiding innovation project participants on using these methods and frameworks. Their methodological approach was built on the following principles:

1) Capture patients and professionals' needs for improvement in regular practice. This was usually done through a first meeting at the clinic. The "Innovator" (patient, health provider, decision maker, etc.) met with an innovation advisor from the Innovation Clinic to identify bottlenecks within current practice.
2) Mobilize resources for a valuable intervention. The Innovation Clinic held a strong belief that an interdisciplinary approach was needed in order to create a robust intervention. Workshops that gathered patents, professionals and decision makers proved to be an important tool in this phase.
3) Iteration and stepwise implementation. The distance between need, intervention and implementation was often recognized to be quite substantial, and usually the first attempt at an intervention did not fully cover the needs. A stepwise approach to implementation was thus

developed to reveal inefficiencies and insufficient understanding of the problem while the intervention was still transformable.

In the following sections we present four of the 11 innovation projects to show how the Innovation Clinic worked to promote and facilitate innovation through this early phase. These four projects were selected for our analysis due to their potential to display how IC learned to facilitate service and organizational innovations across the hospital.

We have utilized the framework from Teece (2009, 2014) as an operationalization of dynamic capabilities into 'sensing', 'seizing' and 'transforming'. We have reviewed the empirical data from the four innovation projects analyzed, utilizing the different concepts for classification of the activities in each project. Next, we have analyzed the similarities and differences across the projects, including how these could indicate learning across projects over time. This analysis formed part of our attempt to investigate the relationship between dynamic capabilities and innovation capabilities.

## Advanced Home Hospital for Children

### *Sensing and shaping opportunities*

This project had the aim of improving the hospitalization of children with long-term treatment needs. This is an idea that had been circulating across many hospitals for a few years, but its realization had been slow. A project titled 'Advanced Home Hospital' (AHH) was initiated at the hospital, aiming at improving health care for small children, as well as solving capacity challenges of the hospital. Especially in cases with chronic conditions, being away from family and friends can be traumatic for the patient and stressful for the family involved. The AHH project started with an extensive medical literature review, establishing evidence that hospitalization at home had great potential without downgrading treatment quality. According to available studies, the families and children did not have any adverse opinions about safety or treatment. Instead, they reported greater well-being than during normal hospitalization. The next step was the development of a simulation model of costs and benefits of the AHH solution. The simulation showed indications that home hospitalization could provide large cost savings over inpatient practice. The major savings came from reducing overhead and salary costs.

### *Seizing the opportunity*

Based on the indications from the literature and the simulation, the decision was made to implement AHH as a part of the Child and Youth Clinic at the hospital. Soon, however, it became clear that the AHH innovation was not well anchored with the physicians in the clinic. Pediatric nurses were involved early into the project, whereas the physicians would normally be at the top of the clinic hierarchy, and the lack of a strong alliance with the physicians seemed to inhibit the nurses' commitment to and support of the project. In addition, there was a challenge of understaffing, and therefore high work pressure, at the clinic. To undertake the home treatment of children demanded a different orientation towards practice, as well as a redesign of the work processes. Even though the project was implemented, it did not reach enough support and alignment with the management of the Child and Youth Clinic to reach the estimated potential.

### *Transforming practices and capabilities over time*

A few years later, AHH still operated with insufficient resources compared to the identified need, and it could only extend treatment to a limited number of patient groups. However, in line with the networking role of the Innovation Clinic, activities were initiated to introduce AHH at an adjacent university hospital, with higher management commitment and more resources. Despite the challenges and shortcomings, the AHH project seemed to contribute to the Innovation Clinic's learning and thus development of innovation capabilities, such as building coalitions, creating change and understanding existing work practices. However, a good idea, good international medical studies and great benefits for the patients and their families were not enough. Resources, existing work practices, and top management support, as well as support from the physicians, were identified as ingredients of high importance. As such, this project contributed in the form of 'trial and error learning', which, arguably, is necessary to develop both ordinary and dynamic innovation capabilities in a complex organization.

## The wound support network

### *Sensing and shaping opportunities*

The Innovation Clinic became involved in two different projects related to wounds. Through conversations with the wound treatment expert group at the Department of Dermatology at the hospital, the IC learned that traveling and waiting time at the hospital represent considerable challenges for patients in need of treatment of severe – and sometimes chronic – wounds.

These patients typically live at nursing homes or have access to home nursing services. Generally, the waiting times for this kind of treatment are long, despite the fact that the probability of healing decreases the longer it takes to get access to qualified help. One of the challenges is that the expertise on wounds is located at the University Hospital, and not within the home health service.

### *Seizing the opportunity*

The key unit in what were referred to as 'wound support networks' were the wound contact nurses who supported the home care service in a district. When an innovation project was established to improve and document the wound support network, three wound contact nurses became part of the pilot in three different city districts. Their task was to provide specialized insight into how to perform wound treatment, in order to support primary care nurses in their respective districts. Thus, the wound contact nurses served as a link between the hospital department and the primary health care services. The wound contact nurses visited and helped all wound patients in their districts, together with the home care service practitioners, every four weeks during the three-month project period.

The Innovation Clinic used both qualitative and quantitative measures in the study of wound healing rates, cost/benefit analyses, and studies of knowledge transfer in the project. Economic indicators were used for the hospital, for the municipality of Oslo and for the total picture across all service providers. Improved clinical results were identified, in addition to the obvious benefits to patients and primary care practitioners, and this also led to cost savings. They estimated that the potential to reduce health care spending could amount to more than USD 4000 per patient year.

### *Transforming practices and capabilities over time*

A new economic challenge was identified, however: while reducing the total costs by 37% in contrast to existing work processes, reducing the number of patients would also reduce the income for the hospital by 26%. This loss of compensation became a hurdle in implementing large-scale changes, despite great benefits to most parties involved. In addition, changing the work practices of the Department of Dermatology at the hospital was in itself not an easy task.

Through this process, the Innovation Clinic learned more about how the capability to analyze, create and implement service innovations, such as the wound support network, could create large benefits to society, in addition to significant cost savings. However, the University Hospital lacked

financial incentives to implement the large-scale changes. The government incentive system was not easy to change. Hence, from this project we can learn that innovation capabilities might also need to be extended into the area of economic organizing – to take care of economic incentives (in this case, ruled by politicians and governmental actors), even at the level of the ministry of health and care. Inter-disciplinary and inter-organizational collaboration, such as collaboration between the government, the hospital and municipalities, requires attention and willingness to change from the respective top management groups, politicians and committed health care personnel.

## Outpatient Tele-Medicine treatment of wounds

### *Sensing and shaping opportunities*

For a long time, telemedicine has been on the agenda in Norwegian hospitals, mainly because of the country's challenging geography. The technical solutions have long been ready for use on smaller scales, but very few services have capitalized on them. This second wound project was a collaborative project with a specialized rehabilitation hospital, the Department of Biostatistics and Epidemiology at the University of Oslo. The Innovation Clinic served as advisors on the project, estimating the costs and benefits of the new forms of treatment to society.

### *Seizing the opportunity*

The project started by investigating the hypothesis: What would be the benefits to society be if we used telemedicine to treat back wounds and pressure wounds? Treatment of wounds in this patient group is complicated and requires a high level of expertise and continuous observation. The downside of unsuccessful treatment is clear: If the cure process shows adverse effects, amputation may be necessary. As mentioned, this project was located at a specialized rehabilitation hospital, and a goal of the project was to explore the benefits of using outpatient tele-medicine on a larger scale.

Patients with severe back injuries as a result of traffic accidents, sports accidents, or diseases were the primary targets. Seven patients with severe back injuries, having lived with this condition for between 5 and 46 years, were enrolled in the project. They had previously experienced between 33 and 601 days of hospitalization. In terms of health care professionals, three home care employees joined the project. The results of this preliminary test showed

that all patients were very satisfied by the treatment via videoconference. On the other hand, they missed the social contact and knowledge sharing with fellow patients.

A core idea behind the project was to help patients avoid hospitalization by supporting home care service teams via telemedicine. In this way, local home care service personnel got new skills and updated knowledge on treating severe wounds. It was found that the time used to treat patients via this method was shorter than at the hospital. However, it took some time at the first treatment in order to set up the video conference equipment and to coordinate the different professionals involved. Estimates showed that the national potential for cost savings could amount to around USD 52 million. The remaining factor of uncertainty was the risk of re-hospitalization in cases in which wounds did not heal according to expectations; still, however, the economic potential was significant. In addition, the new practice provided substantial benefits to the patients and more efficient utilization of the expertise at the rehabilitation hospital.

### *Transforming practices and capabilities over time*

This project showed how innovations related to outpatient telemedicine treatment could be used in several novel areas, potentially with large economic benefits to society (see also Irgens et al., 2015). In addition, the project participants gained experience in using new methods and ways of organizing the work processes and service provision to create less strain for the patients. The weight of the evidence in terms of economic, clinical and patient satisfaction benefits, alongside several similar projects elsewhere, seemed to produce broader agreement among national stakeholders regarding the need for national policy, strategy and funding for scaling telemedicine services. Still, at the time of our study, the long-term outcomes remained to be seen. To sum up, the innovation activities demonstrated in this project, similar to previous projects, required the involvement and coordination of several professional groups, top-down anchoring of the change process, and bottom-up mobilization of resources.

## Breast cancer diagnostics

The last project we will present in our analysis of innovation capabilities at the university hospital ultimately had a large-scale impact on the treatment of patients. The outcome was a major service innovation that made the national headlines both during and after the innovation process.

### *Sensing and shaping opportunities*

Before this project, when a breast tumor was detected, patients were typically forwarded to the hospital by a general practitioner, with the next stage consisting of a set of activities to diagnose whether or not the tumor was dangerous. Through initial explorative investigations, they learned that one of the most difficult challenges was the high variation in the information collected by the general practitioners. In addition, there are many different professionals involved in breast cancer diagnosis, such as general practitioners, radiologists, pathologists and oncologists. To add to the complexity of the process, the hospital's treatment activities were organized at two different locations and with different work processes. In sum, these aspects led to severe coordination problems across different professional groups, departments and organizations, which resulted in long waiting times for the patients.

### *Seizing the opportunity*

The ambitious goal of this project was to reduce the waiting times by 75%, at least for the diagnosis process. The project was designed to improve efficiency, effectiveness, and service quality, as well as patient satisfaction. This time, the project group was successful in mobilizing commitment and participation by the top management of the University Hospital, as well as by leaders at the relevant clinics. A design-based innovation approach was used, and patient experiences were investigated through semi-structured interviews. Coordination and collaboration challenges were explored through multi-stakeholder workshops, leading to streamlining information flows and requirements, patient flows, and more efficient resource utilization. This time, no economic aspects were investigated in the first part of the project. An economic analysis was conducted at a later stage, comparing in-house treatment to outsourced solutions.

### *Transforming practices and capabilities over time*

As a direct result of the project, work processes were permanently re-configured across the participating actors, reducing waiting times for breast cancer diagnosis by 90%. Before this tremendous improvement, the patients were usually left with unanswered questions and distress for months; afterward, the average waiting times decreased from 12 weeks to less than 48 hours. The hospital demonstrated service and organizational innovation capabilities at a new level. The project's success in mobilizing professionals across several disciplines, gaining legitimacy from top management, and facilitating the re-organization of work processes gained wide attention.

To sum up, a rather complex set of investigations and interventions were combined to achieve ambitious aims, including the ability to choose a project with strategic impact, and with the potential to attract attention both internally and externally.

## ANALYSIS AND DISCUSSION

Based on the discussion of the capabilities and the dynamic capabilities literature, as well as the subsequent presentation of the Innovation Clinic case study, we will in the following paragraphs discuss the development of dynamic innovation capabilities. We will also develop an argument for the relative importance of making innovation capabilities dynamic. In our investigation of the Innovation Clinic, we saw the emergence of a set of routines, methods and actions resembling innovation capabilities, particularly related to service and organizational innovation. As argued in the literature section, such innovation capabilities may in some cases be classified as ordinary capabilities. We need, therefore, to discuss the premises for *dynamic* innovation capabilities.

There are several conceptual discussions in the literature regarding what dynamic capabilities can be and what they are not (e.g., Teece, 2007, 2012, 2014). A remaining challenge is to produce empirical insights into how dynamic capabilities can be understood, as well as how we can identify and understand their sources and development. We suggest that the emerging service and organizational innovation capabilities we have identified in this case study can be categorized as dynamic. The reason for this, we would argue, is that they seemed to be (1) applicable to different service areas or markets, (2) evolving over time, and (3) transferable to various actors and coalitions within the organizational space.

In our case study presentation, we used the three criteria of sensing, seizing and transforming (Teece, 2014) to identify the capabilities involved in the Innovation Clinic. Due to the relatively short time span of our empirical study, we cannot argue categorically that the Innovation Clinic contributed to dynamic innovation capabilities across the University Hospital at large, as there are, of course, other forces in motion. Likewise, we cannot be sure that the identified capabilities remained dynamic over longer periods of time. Still, the Innovation Clinic was clearly set up with this purpose. As far as we could observe, the Innovation Clinic worked to facilitate strategic innovation, to change ordinary capabilities over time, and to develop innovation capabilities in new areas through its different projects. This was done both within and at the borders of the organization and the surrounding network of actors. One of the important questions in this theoretical landscape is this;

What makes organizational capabilities dynamic, and, more specifically, how are dynamic innovation capabilities constituted? Answers to this question should be sought in the interface between the theoretical framework and empirical research. From our case study, we find that dynamic innovation capabilities may emerge from a combination of entrepreneurial management and organizational elements, much in line with Teece's (2012, 2014) conceptualization of dynamic capabilities. Before going further into the discussion of dynamic innovation capabilities, we will first take a closer look at the role of organizational elements and of entrepreneurial management.

## Organizational elements

In the case study, we identified the systematic development of particular processes, methods and routines in the work of the Innovation Clinic. Some of these organizational elements related to *sensing* by focusing on 'capturing' needs and opportunities within and across hospital clinics and departments, and then performing initial evaluations or simulations of the potential benefits of developing a solution to the problem. Further, several of the organizational elements related to *seizing*, in that they were set up to support the mobilization of resources. Arguably, some of the trial-and-error learning procedures also contributed to seizing, as they were primarily helping the local project to develop unique solutions to the current problem at stake. Other parts of the trial-and-error activities pointed more towards the *transformation* of capabilities across settings and time. The tools for simulating, modelling and evaluating service innovations were continuously developed across all the projects, gradually increasing the argumentative power of top management and other stakeholders. Project by project, the IC personnel learned more about a number of important barriers and enablers that needed attention, as well as about the tactics of managing innovation processes.

By partially emulating and modifying common methods and routines in medicine, such as medical cases, clinical trials and health technology assessments, the IC gradually maneuvered into a position from which they could advocate for what we would call innovation routines. Some of the routines for innovations included a digital idea portal, new methods such as service design methods; a method for modelling, simulating and assessing innovations; and stepwise trial-and-error processes facilitated by the Innovation Clinic team. As shown in the case study, the major aim of the Innovation Clinic was to challenge the status quo by facilitating service innovation throughout the organization. They pursued relatively radical ideas of patient-centricity, mobile and digital service provision, and inter-disciplinary

and inter-organizational reconfiguration of services. Hence, we can suggest, firstly, that the Innovation Clinic was set up to create or strengthen the dynamic innovation capabilities of the organization, and secondly, that the IC demonstrated some success in actually facilitating dynamic capabilities, although not without difficulties and limitations.

More operational innovation activities, such as 'lean' projects, as well as more radical changes strictly related to advanced and specialized medical procedures, were left to each of the medical clinics and the general administration. This is not to say, however, that specialized medical innovation capabilities do not need to be dynamic. Indeed, the hospital had already established other units to facilitate innovation in certain advanced medical technologies (see, e.g., Mørk et al., 2012, on medical innovation). Still, hospitals have traditionally shown a stronger ability to make radical shifts related to highly specialized medicine, while generally under-performing on innovation related to *service*, *coordination* and *organization*.

## Entrepreneurial management

While important, organizational processes, routines and methods are probably not sufficient to maintain innovation capabilities *dynamically* over time. We would expect such organizational elements to easily become specialized and limited to narrow aspects of practice or, alternatively, to stabilize into inflexible and self-referencing procedures over time. Hence, entrepreneurial management seems to be important for the 'dynamic' element of innovation capabilities. In our case study, the Innovation Clinic performed a strong entrepreneurial role in the organization and its network of partners and stakeholders. Notice, for example, how the Innovation Clinic personnel worked very proactively in identifying clinical managers with 'mature problems', who were therefore ready to collaborate to find novel solutions. They also focused on building alliances with research institutions, administrators of innovation policy instruments and funding, and the hospital's important partners, such as primary health care providers.

Any organizational routine or method may soon become stiff and contribute more to conserving and incrementally improving established practices than to reorientation and radical innovation. It seems necessary to maintain active boundary spanning across the organization and its network, visionary agenda setting, and competent change management in order to stay alert to sensing, seizing and transforming capabilities in order to creatively adapt to changing environments. Reflecting on the case study, we can see that the 'dynamic' aspect is precarious; it seems that the dynamism of this organizational setup relies mainly on only a few individuals in the

Innovation Clinic and their combined experience, attitudes, social networks, and competencies. It is therefore a potent question to ask to what extent the university hospital may be seen to develop and maintain dynamic innovation capabilities in the long run (i.e., beyond the timeframe of our study).

We suggest, in line with Teece (2012), that it is precisely this combination of particular routines, processes and methods, with a strong entrepreneurial management role, that may facilitate the emergence of dynamic innovation capabilities over time. The presence of entrepreneurial management without the necessary organizational elements in place would most likely produce innovation capabilities that are utopian, fragmented, and short-lived. On the other hand, to install organizational routines to support innovation, without entrepreneurial roles, could quickly lead to non-dynamic and inflexible arrangements, at best classified as functional or ordinary innovation capabilities. This leads to the following question: How can entrepreneurship be maintained over time? Stark (2009) and Moreira (2012) identified 'entrepreneurship' as embedded into organizational configurations and, thereby, possibly achieving a more robust entrepreneurial organizational role than the more individual and team-based model identified in our case study. Stark (2009) argues that 'heterarchical' arrangements may be put in place, in which multiple and *competing* principles and criteria of evaluation are regularly allowed to confront each other, to challenge the status quo, and to produce novel interpretations of opportunities and resources. We find this way of performing and organizing the entrepreneurial role beyond the individual level in organizations to be a highly interesting avenue for further research.

## Nurturing dynamic innovation capabilities

Finally, we will discuss the importance of nurturing dynamic innovation capabilities, relative to functional innovation capabilities, for strategic management. While the systematic and incremental improvements typically produced in the daily activities of highly specialized and competent organizations like this University Hospital provide considerable value, we find reasons to argue that the dynamic aspects deserve more attention from the top management of large and complex service organizations. Some authors have claimed that the continuous improvements during daily activities account for a larger share of value creation than the earlier radical leaps that brought the organization onto the new path. Still, looking at a large university hospital, we can see how, at least in relation to medical procedures, quality improvement work is already in place, permeating the whole clinical organization; every medical profession is trained for systematic improvement

and is rewarded for merit in mastering established practices. This system of merits and rewards, of course needs to be regulated, monitored and encouraged, but, still, the nurturing of dynamic capabilities remains to be handled by many top management teams. A public and research-oriented service organization like the University Hospital may be seen as a strong case in this respect, having more stakeholders and a more complex mandate than many private firms but an equally fast-changing environment.

In terms of analytical insights from this study, we started out with the research question regarding understanding the relationship between dynamic capabilities and innovation capabilities. The various definitions and subsequent theories on dynamic capabilities and innovation capabilities overlap somewhat and are sometimes unclear and inconsistent (Breznik & Hisrich, 2014). This has been the starting point for this investigation. As we have seen, there are several definitions of dynamic capabilities and of innovation capabilities. For practical and operational purposes, we chose Teece's (2009) conceptualization of dynamic capabilities as a way to sense and seize opportunities, and transform assets. From the empirical data and our analysis based on Teece (2009; 2014), we observed how some projects were adopted and realized in the larger organizational system, while other projects faced more difficulties in realizing their aims.

We saw how the capabilities to sense opportunities could be developed relatively easily, such as through initiating dialogues with clinical managers about their experienced challenges and problems. Seizing and transforming, on the other hand, required systematic learning over time in order to develop methods for estimating and evaluating *value* to the organization and its partners, as well as managing attention and alignment of interests in other ways. Hence, dynamic innovation capabilities seem to be realizable through relatively advanced combinations of methods, routines and processes on the one hand and entrepreneurial management on the other.

The concept of dynamic capabilities was developed in the field of strategic management research. On the other hand, innovation capabilities emerged from studies on innovation and must be regarded with this in mind. From the project universe of the Innovation Clinic, innovation capabilities arose as closely related to innovation practices, while dynamic capabilities, ensuring long-term adaptation and survival, seem to require transformational capacities at both the operational and the strategic levels of the organization. There are clearly overlaps, and in some periods the innovation capabilities may contribute to modify or interact with dynamic capabilities, while in other periods innovation capabilities seem to be more functional as parts of the daily practices of the innovation clinic and other organizational units. As discussed by Winter (2003), it is sometimes difficult to know exactly when a

capability is dynamic and when it is operational. To some extent, we can only understand and analyze afterwards whether learning, change or modification of routines has occurred.

## CONCLUSION

Our ambition in this paper has been to gain a better understanding of what makes organizational capabilities dynamic and, more specifically, how dynamic capabilities can be constituted and nurtured. We utilized Teece's (2007; 2014) framework on dynamic capabilities as an analytic framework, in order to elaborate on the existing theory. From our analysis of the four different projects, we argue that dynamic innovation capabilities comprise the following elements. Firstly, the systematic development of processes, methods and routines was related to *sensing* and *seizing* opportunities – or, as it was phrased by the Innovation Clinic, 'capturing' needs – and subsequently working systematically with iterative development and implementation. Secondly, the role of entrepreneurship produced dynamics related to sensing and was, perhaps, particularly important for *seizing* by mobilizing resources and aligning stakeholders with diverging interests in the innovation. Thirdly, the combination of strategic and entrepreneurial management of innovation across time and domains may serve to support the continued capacity for *transformation*.

In terms of managerial implications, we argue that managers should be particularly oriented towards the following factors to develop innovation capabilities:

- Systematic development of processes, methods and routines to sense and seize opportunities, including the facilitation of inter-group learning, the evaluation of innovation hurdles and potential value, and iterative and effective implementation.
- Organizing and nurturing entrepreneurial roles, in the organization and its network, of partners and stakeholders, as well as the subsequent entrepreneurial management to make innovation and transformation happen.
- Nurturing dynamic innovation capabilities instead of focusing only on functional innovation capabilities, by emphasizing innovation capabilities at both the operational and strategic levels, hence becoming an integrated part of strategic management and execution.

As a final note, we would like to pinpoint some of the limitations of our current study of dynamic capabilities and innovation capabilities. First, the time span of this study is too limited to ensure that we fully understand the nature of dynamic innovation capabilities, and it might be preferable

for capabilities to last through more than one business cycle in order to be clearly dynamic. There is a need for longitudinal studies of the development of dynamic capabilities, innovation capabilities and dynamic innovation capabilities, in order to be sure that the capabilities are really dynamic over time. Second, this study is of a public organization, whereas the concept of competitive advantage might be more natural in a corporate setting. The nature of competition for resources and endowments in a public organization differ from that of private enterprises. However, we argue that long-time adaptation to the environment is as important for public sector organizations in general and for university hospitals in particular, as for private firms. Furthermore, it would be interesting to gain a better grasp on how dynamic capabilities alter operational innovation capabilities. Many firms and public sector organizations employ institutional mechanisms similar to those of the innovation clinic, with various levels of success. Comparative studies of various institutional mechanisms that contribute to innovation in larger for-profit and not-for-profit organizations would be highly interesting.

In this case study, we have investigated an Innovation Clinic's efforts to develop service and organizational innovation capabilities over time and across several settings. We have demonstrated how the conscious development and employment of innovation routines and methods at the project and organizational levels, in combination with entrepreneurial management, may well contribute to developing innovation capabilities. The development of such combinations, however, is not likely to be easy, considering the significant number of institutional, organizational, epistemic and financial elements to be upgraded and recombined for project outcomes to stabilize and scale, in addition to the challenges of utilizing the experiences of such efforts for building *dynamic* innovation capabilities across settings and over time. Due to the limited time-span and scope of our case study, we are only partially able to shed light on one crucial aspect of dynamic capabilities – namely, the 'transformation' of capabilities across time and space. The emergent learning and development of methods and routines across the series of multi-stakeholder projects seems to be in line with Teece's (2009) conceptualization of dynamic capabilities. Nevertheless, it was not possible within the time limits of our study to evaluate whether we are seeing the transformation of capabilities in ways that significantly contribute to the renewal of the hospital over time and across a variety of contextual changes.

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## Abstract (in Polish)

*W badaniu tym zbadamy zależność między dynamicznymi zdolnościami a innowacyjnością. Dynamiczne zdolności są podstawą zarządzania strategicznego, jeśli chodzi o to, jak firmy mogą zapewnić adaptację do zmieniających się warunków w czasie. Nasz artykuł przedstawia dwie ścieżki argumentacji. Najpierw przeanalizujemy i przedyskutujemy znaczący wkład w teorie dotyczące zwykłych zdolności, zdolności dynamicznych i zdolności innowacyjnych. Staramy się zidentyfikować różne rozumienie omawianych pojęć, aby wyjaśnić różnice i relacje pomiędzy dynamicznymi*

*zdolnościami a zdolnościami innowacyjnymi. Po drugie przedstawiamy studium przypadku „Kliniki Innowacji" w głównym szpitalu uniwersyteckim, w tym cztery projekty innowacyjne. Korzystamy z tego studium przypadku w celu zbadania i omówienia sposobów rozszerzania zdolności dynamicznych, a także w jakim zakresie zdolności innowacyjne można uznać za dynamiczne. Podsumowując, dyskutujemy o uwarunkowaniach rozwijania „dynamicznych zdolności innowacyjnych" w organizacjach.*
***Słowa kluczowe**: zdolności dynamiczne; zdolności innowacyjne; innowacyjność usług; opieka zdrowotna.*

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