

Enlightening the Dynamic Capabilities of Design Thinking in fostering Digital Transformation

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ABSTRACT

Digital transformation describes the deep-seated changes in organizational activities, processes, and capabilities induced by the advent of digital technologies. Digital transformation requires dynamic capabilities to change digital technological challenges into opportunities. Academic literature acknowledges the central role of design as a driver of innovation. Furthermore, recent research discloses the value that design, especially design thinking, can have in leading digital transformations. In this understanding, design thinking has been proven to be an approach based on dynamic capabilities. What seems to lack in the current understanding is how the dynamic capabilities of design thinking can facilitate digital transformation. Thus, the paper aims to shed light on how dynamic capabilities of design thinking foster discovering the opportunities digital technologies provide to enact the transformation. This paper investigates four different cases of consulting projects, a business-to-business market, where the adoption of design thinking dynamic capabilities enhance the value of digital technologies toward a more human centric digital transformation. Examining them, the paper proposes five design thinking dynamic capabilities that managers should cultivate: *extending, debating, cropping, interpreting, and recombining*.

Concerning academic debate, the paper enriches the understanding of digital transformation by unshadowing the value that design thinking dynamic capabilities might play in it.

KEY WORDS

Design Thinking, Dynamic Capabilities, Digital Transformation, Digital Technologies, Innovation, Design Capabilities

1. INTRODUCTION

The modern era is increasingly permeated by digital technologies that are transforming our society, as they are not only at the base of many companies' products, services and operations, but also at the root of the radical change in nature of innovations (Yoo et al., 2012). A new kind of firm has emerged in the age of Artificial Intelligence (AI) and it has deeply affected how value is being delivered (Iansiti & Lakhani, 2020). Companies such as Google, Facebook or Alibaba are an exemplification of how value is no longer being delivered by the traditionally human-operated business processes, but rather by the system itself and its algorithms (Iansiti & Lakhani, 2020). This, together with constant connectivity, has enabled new dynamics of experience for people, and ultimately affected their behaviors and expectations (Verganti et al., 2020). In fact, technology has empowered people to become increasingly demanding, for they seek instant gratification from companies that have to provide them with what they want, where they want it, instantly and effortlessly. These dynamics of experience, however, have affected not only people's personal sphere but also their professional one and seems to quest for different approaches to induce a positive impact.

As a result, businesses are now being confronted both internally and externally with novel challenges, deeply entangled with digital transformation. Artificial intelligence, big data, and blockchain are just some of the digital technologies that are transforming our society (Williams & Edge, 1996; Trabucchi et al., 2018; Magistretti et al., 2020). Consequently, to their emergence in the business environment, companies are now forced in the run for digital innovation and transformation (Ghezzi and Cavallo, 2018). Digital transformation has been conceptualized by Nambisan et al. as "the creation of (and consequent change in) market offerings, business processes, or models that result from the use of digital technology" (2017). As AI, big data technologies entail great uncertainty and ambiguity (Nambisan, 2017), companies facing the digital transformation often struggle to understand how to adequately develop solutions that are able to sense, seize and reconfigure the challenges induced by such digital technologies in opportunities and unveiling the true value of technologies (Verganti and Oberg, 2013; Magistretti et al., 2020).

Consistently with the general bewilderment of companies on the way to effectively approach digital transformation, research has placed its attention in understanding how digital technologies can be adequately employed for (and in) the development of digital solutions, to be adopted and accepted by humans (Danneels and Frattini, 2018). In this direction, both scholars and practitioners have introduced and defined several approaches to manage digital technologies and guide companies in developing different solutions (e.g., Cooper and Sommer, 2016; Ries, 2011; Nowacki and Bachnik, 2016; Cooper,

2019). While these researches have shown the value of technology-oriented approaches, less attention has been dedicated to the capabilities that firm's should enact in the pursue of digital transformation that can be more valuable for humans (Arbesman, 2016; Trabucchi and Buganza, 2019); where more valuable means more meaningful and useful for humans (Verganti, 2011). Only few recent studies have unpacked the role that dynamic capabilities have in chasing such digital transformations (Warner and Wäger, 2019). Dynamic capabilities are defined as the capacity of firms to dynamically create and combine resources to sense, seize and reconfiguring opportunities during transformations (Teece, 2007). Thus, Warner and Wäger, 2019, by studying the digital transformation through the lens of dynamic capabilities propose a set of digital sensing, seizing and reconfiguring capabilities that managers should embrace to foster transformation. However, despite such recent evidence, there is scant research that examines how firms build dynamic capabilities for digital transformation especially if the focus is not on the digital nature of the transformation but if the focus is on the value generated to end users. According to Danneels (2004), the impact of technology should be assessed by looking at how technology is meeting people's needs. For this reason, innovation approaches that deal with humans and their needs (Beckman & Barry, 2007; Brown, 2009) could play an important role in this, as shown by the growing interest among academics and practitioners (Verganti, 2017; Micheli, et al., 2019). However, research along this line have mainly focused on understanding how human-centred approaches, such as design thinking, can contribute to crafting innovations and less is known on their role in digital transformation (Çetinkaya, Johansson-Sköldberg & Woodilla, 2013; Liedtka, 2015; Micheli et al., 2019). So, even though the value that design, especially design thinking, can have in innovation is acknowledged by scholars (Beckman & Barry, 2007; Brown, 2009; Cankurtaran and Beverland, 2020), design thinking has been proven to be an approach based on dynamic capabilities for managing creativity and bias in innovation projects (Liedtka, 2020) and recent publications show the value that this approach can have on the practices that design thinkers should embrace to unveil technological opportunities (Verganti et al., 2020; Pham et al., 2021). Notwithstanding this, less is known on the value that design thinking, seen as a set of dynamic capability, can have in the digital transformation field. Thus, we posit that dynamic capabilities can be a powerful lens to study the digital transformation phenomenon when firms embrace the design thinking approach. So, a better understanding is needed of the role that design thinking dynamic capabilities can have in fostering digital transformation. Especially when the focus is to ensure that the underpinning digital technologies enables a digital transformation that answers to user needs and envision more valuable solutions for end users (Verganti, 2011).

In order to increase our understanding on this aspect, we adopted an exploratory approach, as we have analyzed four cases of different consulting firms employing the design thinking approach to foster digital transformation. We deemed consulting firms appropriate for the setting, as they are called upon by firms to manage the development of digital transformation. The business-to-business (B2B) environment in which the consulting firms operates can be a very interesting field to shed lights on the design thinking dynamic capability for digital transformation. This due to the mediation that consultants do in innovation project (Strike and Rerup, 2016), and thus the support in reinforcing the ability and capability of firms. More specifically, the paper aims to shed light on how design thinking dynamic capabilities foster the discovery of the opportunities underlying digital technologies, thus enacting the transformation. By studying a B2B environment the research looks at how the dynamic capabilities are built by the collaborations between the consulting organization and the client firms. This mediation role that consulting firms have in the digital transformation pursue, and the ability to enact design thinking dynamic capability to cope with the scope is an interesting finding of our research. Examining this interaction between consultants and firm's managers, the paper identifies five design thinking dynamic capabilities that can support the digital transformation: (i) extending – i.e., amplifying the shared knowledge base through constant collaboration diverse stakeholders; (ii) debating – i.e., questioning the technological challenge by juxtaposing digital and human perspectives, (iii) cropping – i.e., selecting technological requirements on the basis of the users, (iv) interpreting – i.e., adopting a different perception frames to investigate the different facets of the technological challenge, and (v) recombining – i.e., combining technological and human knowledge within an holistic framing. These five capabilities reinforce the understanding of design thinking as an approach routed on dynamic capabilities and how it can help in coping with digital transformation.

2. LITERATURE REVIEW

Researchers recognize digital technologies in the field as the practices, processes, and principles that underlie the effective orchestration of digital transformation (Nambisan et al., 2017). In today's society, this orchestration can be tough, to the point that the external network perspective is crucial (Leonardi, 2013). Indeed, the most essential characteristic of digital transformation is the convergence of industries and firms that collaborate more and more thanks to digital technologies (Chen, Chiang, & Storey, 2012). Moreover, digital technologies have introduced three qualitative changes in terms of representation, connectivity and aggregation (Adner et al., 2019). As consequences of these three changes, there are, respectively, a great amount of new data, the shattering of constraints of information availability, and the

possibility to address formerly impossible questions (Adner et al., 2019). Thus, firms dealing with new digital technologies and the development of digital transformations have to cope with increasing complexity and flexibility, as they entail the aforementioned changes and fast-evolving conditions (Kollmann and Kuckertz, 2010). For this reason, companies are asked to develop more dynamic capabilities, to support them in rapidly adapting their business to the change, obtaining competitive advantage (Teece, Pisano, & Shuen, 1997).

Dynamic capabilities are defined as the capabilities that firms have in create and evolve resources they have in their hands (Teece, 2007). In respect to the development of digital transformation, and ultimately the adoption of digital technologies these dynamic capabilities might collapse with the capabilities presented in approaches to new product development and processes related to digital technologies (Teece, 2012). A recent study unpacks a set of digital sensing, seizing and reconfiguring capabilities by showing how dynamic capability can inform digital transformation (Warner and Wäger, 2019). Nevertheless, it focuses on the correlation between digital dynamic capabilities and the innovation frameworks that focus on technological impact, thus leaving untapped the correlation between dynamic capabilities and those innovation frameworks that focus on user. Indeed, the innovation field presents many approaches that cope similarly with strategic renewal or collaborative practice to engage toward innovation (Day, 2011), but within them the role of dynamic capability is still under researched if the ultimate goal is to assess the impact that a different set of dynamic capability might have on the value generate by the solutions in the end users. The literature about agile and hybrid stage-gate models showed how capabilities such as flexibility and productivity are central in a continuous innovation (Cooper and Sommer, 2016). Being able to keep open the development of technology up to the very end of the project and focus the attention on speed is essential to cope with strategic renewal and innovation (Gobble, 2018). Notwithstanding this, in such approaches, it is clear how the perspectives adopted are strategical and focused on the process and procedures rather than on the dynamic capabilities needed to manage the digital transformation to create more value for users and to solve their needs.

This lack of understanding of the role that dynamic capabilities can have in digital transformation when the focus is not pertaining strategy and business models (Warner and Wäger, 2019) but concerning the creation of users' value and solve needs (Liedtka, 2020; Verganti et al., 2020) requires the consideration of different approaches.

In shifting the focus from firm strategy to users' value, a growing body of research in innovation literature have shed light on design thinking as an innovation approach centered around humans and their needs (e.g., Beckman & Barry, 2007; Brown, 2009; Carlgren et al., 2016). Framed in 1987 by Rowe's study. Since then, several studies have been published, and academic attention has grown exponentially (Çetinkaya et al., 2013; Micheli et al., 2019). In particular, the most common interpretation of design thinking is based on the idea of facing wicked problems with creativity and a naïve mind, usually it goes under the label of creative problem-solving approach (Buchanan, 1992; Coyne, 2001). Further studies on design thinking as creative problem solving highlighted different aspects and adopted different perspectives on processes (Çetinkaya et al., 2013) and people (Liedtka, 2015) but still few research attempts to look at the dynamic capability needed to enact this approach. One of the most diffused frameworks describing this kind of design thinking is the double diamond that the Design Council proposed, characterized by the alternation of divergent phases aimed at exploring possible alternatives, called *problem space*, and convergent phases aimed at identifying the dominant alternative, often called *solution space*, (Dell'Era et al., 2020). The process embedded in the double diamond is structured in 4 phases, described as sequential, even if they actually require different iterations and dynamicity (Dell'Era et al., 2020), but scatter knowledge is present on the dynamic capability needed to enact such approach. Each phase addresses specific objectives, the discovery phase is where the different categories of users are identified in order to holistically understand the user needs and desires (Kuijken et al., 2017) that can be explored through different methodologies based on primary (interviews, ethnographic observation, etc.) or secondary sources (trends, research on lifestyles, etc.) (Luotola et al., 2017). This practice is all about empathizing with the recipients of the design through observation and ethnography, with the aim of solving problems from their perspective (Brown, 2009; Holloway, 2009; Ward et al., 2009). The define phase requires a critical attitude in analyzing the collected information in order to properly frame the problem to be solved. If the discovery phase is based on divergent thinking to foster creativity, the define phase aims at reframing the problem and glimpsing possible paths towards the solution (Boland & Collopy, 2004; Drews, 2009). If getting started is half the job, identifying, framing, and re-framing the problem to be solved are crucial in design thinking. Probing questions aim at challenging the status quo and steering the innovation process towards criticism and embracing truly innovative directions (Verganti, 2016, 2017). The following two phases move within the *solution space*. During the develop phase, first ideas and then more detailed concepts are designed. Imagination describes designers' propensity to look laterally at reality, explore unconventional alternatives, and perceive situations from innovative perspectives (Casakin, 2007). A visual approach enables understanding abstract and intangible concepts in a better and deeper way, grasping all the facets

hidden in the ambiguity of words alone (Carr, et al., 2010; Ward et al., 2009). Finally, in the deliver phase, the most valuable concepts are prototyped in order to test them and therefore understand the effective adherence of the solution to user needs and desires (Pham et al., 2021). In a design thinking process, problems are tackled through an experimental approach. This mentality allows them to select the most promising directions for the innovation process (Brown, 2009; Fraser, 2009; Holloway, 2009). The practice of learning-by-doing relies on the power of tangibility. Turning an abstract idea into something real allows design thinkers to test it, to reveal new opportunities therefrom, to share it with others in a more effective way, and obtain their feedback (Boland & Collopy, 2004; Lockwood, 2009; Rylander, 2009). The above mention review of the extant literature and knowledge on creative problem-solving approach within the design thinking paradigm unshadow how such process is deemed to be a good approach to cope with user needs, but less is known on the role it might have in dealing with the development of digital technologies. Only few attempts have been made by scholars to unpack the role of design thinking in the digital technology world (Verganti, et al., 2020; Pham et al., 2021) and both of them looked at practices that designers should embrace to manage technologies without introducing the view over dynamic capabilities. On the other hand, Liedtka, 2020, paper connects dynamic capability with design thinking but not to foster digital transformation but to reduce bias associated to the development of the technological solutions.

Even though researchers appointed how design thinking is rooted on dynamic capabilities (Liedtka, 2020) and dynamic capabilities are useful for digital transformation (Warner and Wäger, 2019) the role that design thinking dynamic capabilities can have in digital transformation is still missing and requires more knowledge. Thus, the paper aims to shed light on how design thinking dynamic capabilities foster discovering the opportunities digital technologies provide to enact the transformation.

3. RESEARCH METHODOLOGY

In view of our research question on how design thinking dynamic capabilities can support the transformation of technological challenges into opportunities for end-users, ultimately fostering digital transformation, the case study methodology is deemed the most appropriate (Yin, 2011). Indeed, considering the multifaceted aspect of this complex phenomenon, an exploratory case study can help shed light on the topic. In particular, we draw on a literal replication of cases of companies adopting design thinking to manage and develop their innovative projects based on digital technologies.

3.1. Empirical setting

In this article, we focus on four innovation projects developed by leading consulting organizations in 2018 adopting design thinking as a methodology to enhance the value of the opportunities of digital technologies. More precisely, we analyze four projects undertaken by Design Group Italia, DOING, IBM, and Triplesense Reply with clients that operate in completely different industries: insurance, public administration, telecommunications, and energy.

To select the cases, we adopted theoretical and convenience sampling (Easton, 1995; Dubois and Gadde, 2002; Siggelkow, 2007). In particular, concerning the theoretical aspects, these four firms provide an excellent research setting, as they are pioneer adopters of design thinking methods aimed at developing digital innovations. Adopting the definition of design thinking that Brown (2009) proposed, we selected these companies for promoting innovation starting from the investigation of user needs. In addition, all faced the digitalization issue theoretically discussed in Nambisan (2017) and can help shed light on the continuous evolution of the scope, features, and value of the offerings determined by digitalization. Regarding the sampling, the study focuses on consulting organizations, as the authors have been involved with these companies in a multiyear research platform and have good connections with their managers. Table 1 provides a synthetic overview of the four projects along different dimensions: consulting organization, client, and project objectives.

(Insert Table 1 about here)

3.2. Data collection

The study relies on data collected over a year of interactions with these four consulting organizations. Due to the exploratory nature of the research, we performed two waves of interviews, the first focused on understanding the main boundaries of the research, the second aimed at validating the first intuitions and deeply investigate the evidence gathered (Von Krogh, Spaeth, & Lakhani, 2003). Two exploratory interviews were organized during the first wave to setup up each case study (see Appendix 1); at least three additional semi-structured interviews were undertaken in the second wave to collect insights from different perspectives, viewpoints, and stakeholders (see Appendix 2). The interview guide adopted in the second wave interviews is based on the Double Diamond framework described in the literature review section, identifying the design thinking practices adopted by the consulting organization to capitalize on the opportunities of digital technologies. Each interview lasted between 2 and 3 hours. All the interviews were taped and transcribed. In each consulting organization, the key account and project leader were interviewed by both researchers. This gave us access to those most knowledgeable about the consulting

project. Considering both the first and second wave interviews, the dataset represents almost 40 hours of interviews and 400 pages of transcripts (see Table 2). Most of the data were collected during the interview. Rich secondary sources such as project deliverables, presentations, and reports were collected to triangulate the information collected through the interviews.

(Insert Table 2 about here)

3.3. Data analysis

The data analysis was based on the interview transcripts. For the analysis of the gathered data, the authors have followed the qualitative and interpretative approach proposed by Creswell (2009). It developed in 4 main steps.

Step 1. Our analysis began with the transcription of the raw data collected during the interviews. Indeed, we transformed the recordings of the interviews into text format.

Step 2. With the transcripts of the interviews, each researcher analyzed the cases separately from the others. Each researcher repeatedly read through to data to deeply immerse in each case and fully know the data (Rossman & Rallis, 2011). As a result, each researcher organized the data into chunks that were then analyze and interpreted (Rossman & Rallis, 2011). This in-depth analysis provided the cornerstones for the identification of relevant themes.

Step 3. During this stage of the analysis, researchers rejoined to share the relevant themes they had initially identified. The researchers decided not to codify the empirical material. Instead, the researchers analyzed the data textually, to identify the themes that pertained to the conceptual elements of design thinking capabilities. The chunks of data were interpreted as “abstract units of information” (Creswell, 2009, p.174). This resulted from an iterative and inductive process that witnessed a continuous move between the data and themes until a comprehensive set of themes was found. The themes defined five design thinking capabilities that enabled the transformation of digital technology challenges into opportunities, thus enabling the digital transformation.

Step 4. In the final iteration, the researchers crystallized the five themes and cross-checked them by performing a backward classification. Indeed, they re-classified the quotes under the five themes, to check whether the themes would embody all the diverse perspectives from the interviewees.

4. EMPIRICAL RESULTS

The analysis of the four cases allowed us to identify five design thinking dynamic capabilities that enable the transformation of technological challenges into opportunities. To capture the aspects of the design thinking dynamic capabilities adopted to drive digital transformation, this section is organized in four subsections, respectively on the four cases. The narration of the cases and how the consultants supported the firm in managing the digital transformation and adoption of digital technology in a more human and valuable way let the five design thinking dynamic capabilities to emerge, the fifth section of the empirical summarize the quotes, the evidence, and the emerging capability.

4.1. Welion: Design Group Italia and Generali Italia SpA

When, in 2017, Generali Italia SpA decided to build a portfolio of welfare services for employees, it did not have a clear idea in mind. To support them in the creation of novel and meaningful solutions, they decided to involve Design Group Italia (DGI). Although the direction was still undefined, they soon came to the realization that these services would benefit from a digital integration. This eventually gave birth to Welion, an organization within Generali that offers a set of welfare services for families, organizations and employees. In particular, the collaboration between DGI and Welion brought about the creation of a set of prevention services that leverage on Artificial Intelligence and wearables to educate and support people in achieving their wellbeing. It achieves that through a personalized and automated support system that accompanies the user.

At the beginning, Generali and Welion presented DGI with a broad and ill-defined challenge: they wanted to create a service for the health of employees. Although they wanted the solution to be digital, they were still undecided on which digital technology to use. Hence, DGI began to collect the information to define the problem space. Indeed, they started to map with the Client's objectives, to build the outlines of the problem. As they defined the requirements for Welion, the true turning point was achieved when DGI adopted a different interpretative lens. In fact, they shifted the way they saw the employees of Generali: no longer as clients, but as final users – i.e., the employees that would benefit from the services offered by Welion. This shift in perception, allowed both DGI and Welion to empathize with the user and understand their problems and desires.

“At one point, we started to observe several employees of Generali with new eyes. The idea was to investigate their feelings and expectations towards the welfare services that could be provided by Welion. We collected a lot of data in order to empathize with their daily behaviors: agendas, daily routines, main issues faced in their work life, and so on.”

Lead Service Design

The data collected from the employees of Generali allowed DGI and Welion to define an employee journey and “archetypes” – i.e., user profiles resulting from the cumulated knowledge of user needs and their specific characteristics in terms of approach to technology. These informed DGI and Welion during a brainstorming session that culminated with the generation and selection of high-level ideas. Moreover, they allowed DGI and Welion to search and evaluate the existing digital technologies that could fit the service. In particular, the employee journey allowed them to discuss the technologies by counterposing technological functionalities with human needs.

“we searched for the technologies that could solve the problems we highlighted through our understanding of the users’ feelings and expectations. In our search, we focused on the relationship between the technology and the problems of the employees. Hence, we didn’t strictly stop at the functionalities of the technologies.”

UX Designer

Instead, the archetypes supported DGI and Welion in understanding which digital technologies were more aligned with their behaviors and attitudes, thus defining the likelihood of adoption. In fact, they were fundamental in reducing the number of potential digital technologies, as archetypes stirred the selection of the right technologies.

“We created and selected archetypes considering how they use the technology. If your archetype has specific needs, behaviors and attitudes, technology has to be developed in a specific way to catch their attention. Technology cannot manage all problems. Humanization of technology enters here. Users’ behaviors really define what the IT has to develop, in terms of architecture of service and technology, in order to start with effective creation of the service.”

Lead Service Design

Coherently, it was fundamental to combine all the cumulated learnings from the user experience, and the knowledge of the technological features to outline technological opportunities.

“Opportunities provided by digital technologies such as artificial intelligence and internet of things devices result from the harmonization with people’s life. They don’t represent the solution per se. The combination of the knowledge cumulated during the discovery phase and the one of technology were fundamental to craft the role of technology”

UX/UI Team Manager

Finally, the technological challenge was transformed into a solid solution through the integration of the interpretations of different stakeholders. Each stakeholder extended the shared knowledge base and enhanced the solution, by leveraging on their previous experience.

“The project involved many stakeholders. Some external, and some internal to Generali. The different point of views allowed us to question the service and, at the end, make it stronger. Each person brought their cumulated experience to the table, as they joined previous searches and personal interests. “

UX Designer

4.2. WindTreBusiness Chatbot: Triplesense Reply and Wind3

The telecommunications market is one of the most competitive for numerous reasons: creating tailored offerings is complicated, loyalty in the market is very low, and new entrants prevail. Moreover, Wind and 3 were two different companies that decided to create a joint venture in 2016 in order to become the biggest Italian telecommunication operator, with a 30% market share. In 2017, Wind3 engaged Triplesense Reply to redesign several services addressing the business market (e.g., corporations, SMEs, freelancers). One of the most complicated challenges consisted in improving the lead generation process in the business market. Since the beginning of the project, Wind3 wanted to design a website chatbot that would leverage on Natural Language processing to identify leads. By tackling the technological challenge of designing a chatbot, Triplesense Reply uncovered the greater opportunity of designing a conversational tool that could provide tailored offerings not only to identify leads, but also to engage completely new clients.

As they tackled the problem space, Triplesense Reply engaged the client through a set of brainstorming sessions. These sessions were done with the intent of extending the initial knowledge base, and gather understanding on the Client’s way of working, their objectives and requirements – e.g., they understood the information that Wind3 Business wished to collect through the engagement service. Initially, Triplesense Reply interacted only with the B2B marketing specialists of Wind3 Business, that focused their expertise on the content of the interactions.

“At the beginning of the project, we collaborated closely with the marketing specialists from Wind3 Business. We began by gathering information from their team, as they had greater knowledge about the content that could be handled by the chatbot. We brainstormed together, to build a shared knowledge, which ultimately gave us the possibility to set objectives and clarify also the way to reach them.”

Digital Marketing Planner

The learnings that emerged from these brainstorming sessions shaped the requirements that led to the definition of a first draft of the conversation tree. While creating the conversation tree, Triplesense Reply understood how important it was to enlarge the knowledge base, by including the B2C perspective. In

fact, although out of scope, they decided to involve people from Wind3 that closely interacted with customers to collect insights.

“We eventually decided to change our perspective. We no longer limited to the B2B people. In fact, we included people working in B2C, so people who worked constantly with the final users. This allowed us to collect different points of view about the same service.”

Senior Manager

The integration of the B2C perspective helped Wind3 Business and Triplesense Reply to observe the initial problem with a different lens, as they were able to retrieve the most relevant need of the user, Indeed, they found greater interest in customer care, rather than purchase recommendations.

“The insights from the final users helped us understand the true potential behind this service, it convinced Wind3 that the service could go beyond lead generation, because what clients really wanted was help.”

Senior Manager

Informed by the new insights, Triplesense Reply had the intuition that they could explore the service even further, as they spurred specialists to debate alternative interactions that would encompass both human and artificial operators.

“We challenged Wind3Business specialists in imagining alternative interactions between users and artificial/human operators. This exploration was fundamental in order to properly train the AI algorithm and identify those contexts where chatbot and human operation can collaborate or substitute each other.”

Senior Manager

Eventually, this resulted in the creation of a more “human” machine, that would go beyond the traditional chatbot, as it combined artificial and human, to offer an improved problem solving and marketing features.

“Traditional chatbots are quite effective in solving problems faced by the user. So, when we developed the conversation tree, we tried to mix artificial and human operators, alternate problem solving and marketing features. ”

“We shifted from a structured machine to a more "human" machine. Basically, we moved from a chatbot aimed at selling to a chatbot aimed at taking care of the customer. Hence, changing the initial vision behind.”

Digital Marketing Planner

4.3. HiDubai – Doing part of Capgemini and Department of Economic Development of Dubai

Dubai is among the most dynamic cities in the world in terms of population evolution, investments in real estate, technology, R&D discovery, economic output, and increasing connectivity. When the Department of Economic Development of Dubai approached DOING part of Capgemini, they asked them to develop a directory, in the form of a web-based platform, listing the different SMEs with the aim of exploiting the value behind the data on SMEs owned by the Economic Department. With the population of Dubai consisting of 3.32 million inhabitants of which 2.91 million expats from more than 200 countries, DOING proposed a user-centered approach to develop a directory that would be mindful of the different cultural influences.

To cope with this cultural issue and design the best directory, the company needed to first understand the particularities of the businesses of the SMEs and then the user needs. Indeed, they started to collect data on the merchants of the SMEs and the citizens. Despite the Department of Economic Development owned a large set of data on the SMEs, as these had to be registered in the Department's system to get licensed, DOING underwent a research phase aimed at understanding the peculiarities defining the merchants of the SMEs and the citizens. They did that through ethnographic research, mapping the information on people that reached the psychological model of personality. This "soft"-information was recombined with the "hard"-data on SMEs owned by the Department to imagine compelling directions for the directory.

"Being a Government Department, we expected the client to have plenty of information on citizens and merchants. However, there was only descriptive data on the SMEs! We needed to combine the information from the dataset with new information, more 'human' information."

Design Client Director

This allowed DOING to set the stage and formulate the problem. More specifically, the interactions with more than 50 individuals, 36 consumers, and 25 SME employees inspired the team from DOING to create 9 personas and identify the most relevant variables for designing the service.

"By talking with all the different consumers and merchants, we identified the most relevant insights that were embodied in nine different personas. These personas led us to the identification and selection of the most relevant evaluation criteria for SMEs, they spanned from evaluating the experience, to the revenue model, to the people involved"

Design Client Director

As the project went on, and the insights were consolidated, the team from DOING decided to give greater importance to the cultural differences in the population of Dubai, thus highlighting the different perspectives of Arabs, as opposed to Expats. By interpreting people's needs from the two perspectives,

thanks to the involvement of “like-minded” people – i.e., people with the same nationality or same cultural interactions – they were able to tailor the service on their different attitudes and needs. This way, became more complete, including an app, a predictive analytics algorithm and a series of secondary services.

“Stakeholders during the whole process were a lot, especially for what regards activities that had to be done in Dubai with locals: companies for interviews or ethnographic researches were called in order to mitigate the cultural distance and collect from people the most reliable insights possible in order to create basis for service.”

Design Client Director

After a first testing phase for usability, service and communication, they started to envision with client a 2.0 solution that questioned the interaction between humans and artificial more deeply, as it integrated effectively the predictive analytics to create a network of people and workers, thus going beyond the simple directory, initially requested.

“The HiDubai project is interesting because initially, the client was merely looking for a directory, a huge repository that filters the services offered by the 300K SMEs using tags. Thanks to the human-centered perspective, we completely changed the approach and instead of starting from the data available we started from the users and their needs. We collected and visualized in 9 customer journey the over 100 customer insights.”

Head of Service Design

This was possible also because the Team from DOING decided to invest time in extending their technological knowledge base, that allowed them to collaborate with the technological providers and build a shared understanding of the limitations and possibilities of the technology.

“Talking about Big Data and predictive analytics and working on them to create a service are two totally different things. We needed to learn more about them to understand what we could really do with them. We had what people wanted, but we needed to understand what we could actually do.”

Design Client Director

4.4. MaintenanceApp – IBM iX and Snam

MaintenanceApp was born as Snam, an Italian Energy company, contacted IBM iX for knowledge and expertise in both technology and design thinking. The app aims at improving the data acquisition and analysis process in the maintenance field. More specifically, Snam wanted to provide effective and efficient tools to the workforce dedicated to the maintenance of different categories of plants. Moreover, the aim of the energy company was to imprint a new culture in his team of engineers.

Since the beginning of the project, IBM iX decided to involve the Maintenance Engineers, thus the final users of the service. This decision of involving the final users since the strategic sessions stemmed from the willingness to enlarge their comprehension on the context in which the user operated, thus overcoming possible bias in the design of the technology and the experience. Indeed, they wanted to extend their technical knowledge with the “soft” knowledge of everyday work.

“The design thinking sessions allowed us to understand more on the core issues perceived by different stakeholders.”

Enterprise Design Thinking Chapter Lead

In these initial phases, the team that met with the client was numerous. The aim was to leverage on the different streams of expertise of IBM to debate on the problem setting, considering all the possible layers. To design across the different perspectives, IBM iX involved experts from other business units – e.g., Watson, the internal AI system of IBM or IBM cloud.

“Align the three souls is for us the added value of Design Thinking. We never sacrifice concreteness for methodology, and it means to align each time Business, Functionality and Desire of client: this is what we want to reflect in our team.”

Senior Digital Strategy Consultant

As they understood the high-level requirements for MaintenanceApp, they continued to involve the final users. This time, however, they concentrated on identifying and interpreting the differences among final users. Thus, IBM iX identified two main stakeholders: on the one hand, the workforce in charge of collecting data on plant maintenance, on the other hand, the engineering team in charge of interpreting the collected data and defining the necessary interventions. By empathizing with both senior and junior engineers, IBM iX was able to interpret the current scenario with two lenses. This allowed to identify a sense of unhappiness and frustration especially in the junior roles: they spent the majority of their working time adjusting collected data, merging data from different sources, and understanding possible patterns. In this way, they did not properly exploit their engineering skills, focusing on data analysis instead.

“The design thinking sessions allowed us to understand and focus on the core issues perceived by different stakeholders: maintenance workforce, senior and junior engineers. We created draft user stories in order to properly look at the same process from different perspectives”.

Enterprise Design Thinking Chapter Lead

The direct involvement of the engineers during the co-designing of solutions allowed to zoom in specific functionalities of the solution, that were considered more relevant. Moreover, it also pushed the company to focus not only on solution but also on the cultural change that this solution entailed.

“The collaboration with the users and definition of user stories allowed us to emphasize some requisites. Thanks to user stories, we overcome older methods to get to the requisites, typical of technical teams. “

Senior Digital Strategy Consultant

Finally, during the last phases the IBM worked on the possible solutions. They were discussed with the client every other week, in a continuative prototyping and testing phase. The team combined the pre-existing knowledge on the technology –e.g., the knowledge on Cloud systems previously developed – together with the new gained knowledge on the context, the needs and desires of the users, to prepare reliable solutions for the final user to test.

“They (consultants) were fundamental to combine the concepts in an operational form thanks to their capabilities in empowering each of us, with our own capability and knowledge. These shared in common sessions to identify better problems.”

IT Solution Architect

The result, at the end was not only a service and a system that reduces the time for analysis and data setting, thanks to the exploitation of big data technologies, but also a change in the culture.

4.5. The emergence of design thinking dynamic capabilities for digital transformation

The analysis of the four cases allows us to shed light on different design thinking dynamic capabilities that might foster digital transformation. In particular, by triangulating the information, we have been able to identify five design thinking dynamic capabilities. Table 3 reports the quotes and the classification according to the four cases and the related dynamic capability emerging.

(Insert Table 3 about here)

5. DISCUSSION

The capabilities emerging from the interviews unveil how design thinking is deemed to be appropriate to study and effectively interpret the dynamics of complex systems (Simon, 2019). In facing complexity,

design thinking tackles issues by first considering them in their entirety, including the broader context they derive from (Brown, 2009; Drews, 2009). In the following we connect the five design thinking dynamic capabilities with the theory, and we highlight the first insights about them.

The first dynamic capability emerging from the data is *extending* the knowledge base. In particular, it shows how in pursuing a digital transformation, design thinker should be capable of looking at an innovation challenge not only by considering the specific issue but also by looking at how that issue is influenced by and interacts with the organizational context, market environment, and stakeholder system (Dunne & Martin, 2006). This capability should be built to exploit effectively the suggestions and knowledge provided by different intelligence domains (Byosiere and Leuthge, 2008), such as the artificial and human in fostering the adoption of digital technologies as shown by the Design Group Italia digital system. This view expands the idea that digital transformation is only the translation of non-digital processes into digital solutions (Pagani and Pardo, 2017), but that is the critical, holistic reflection of all the knowledge available to extend the spectrum of impact and foresee where the technology play a better role for users.

The informants also unpack how to foster digital transformation; they leveraged *debating* as a capability. The system's complexity forced the consultants to cultivate the capability of dynamically and iteratively debating among clients and consultants in the project, and this mediation role is typical of consulting firm (Strike and Rerup, 2016). Still, it is not clear how it can be applied in digital transformation and the design thinking perspective. Our insights unveil how designers, by being able to understand and consider the different perspectives and interests of internal and external stakeholder (including users) to frame the innovation challenge in a meaningful way (Micheli, et al., 2019), are building in the team the debating capability as a crucial step for letting the digital solution be grounded on more solid insights. This capability is rooted in the design thinking principle of reframing (Dorst and Cross, 2001). It is founded to be particularly valuable in debating and complementing the views provided by digital technologies, as in the case of the chatbot embedded in MyWind by Triplesense Reply. This view integrates the idea that digital transformation requires discovery, abundance, and partnership (Tronvoll et al., 2020) and needs to dynamically embrace debating to go deeper in the understanding of the opportunity embedded in digital technologies.

The capability to empathize with users is at the core of design thinking (Carlgren et al., 2016) as a dynamic capability and the evidence pointed out how it is also fundamental to properly exploit the value embedded in digital technologies. The incredible amount of information organizations can access in designing innovative solutions calls for significant analytical and capability in selecting the powerful insights. Thus,

the cases inform of the need for managers to leverage the *cropping* design thinking dynamic capability. Cropping as described above helps in select and retrieve relevant data in data-driven design, data is at the center of the process; it is the primary (and sometimes, the only) input, while in data-informed design, data is a key input among many other variables to the point that they allow a deeper understanding of the value provided to users (Liedtka, 2020). As the evidence let emerge the direct interaction with both senior and junior engineers allowed IBM iX to discover that the big amount of information collected by the workforce required a great deal of effort and frequently did not fit with the expectations of junior engineers. This dynamicity in the cropping of insights coming from the true nature of the technology as found to be crucial for mastering fully the digital transformation. In adding to the common needs' interpretation of design thinking (Brown, 2008) a more digital oriented perspective typical of the digital era (Obal and Lancioni, 2013).

Criticizing refers to designers' propensity to constantly ask probing questions to challenge the status quo and steer the innovation process towards experimenting and embracing truly innovative directions (Verganti, 2016). This capability is not static but rather dynamic and supports creative problem solving in different ways, as it helps the actors move away from obvious solutions towards testing ideas internally and engaging in dialogical activities that bring contrasting perspectives to the surface and make them solvable (Verganti, 2017). The more the available data, the more data interpretation becomes crucial. As shown from the iDubai app designed by DOING evolved significantly by cultivating a culture of constant interpretation of insights. Thus, the fourth design thinking dynamic capabilities is *interpreting* and it is grounded on the ability of designers to foresee future scenario (Dunne and Raby, 2013) and of strategically size opportunities embedded in digital technologies (Teece, 2007). So, the result is a dynamic capability that rooted on design ability to early porotype and envision scenario is able to converge over solutions.

The last design thinking dynamic capabilities emerging from the case is the *recombining* one. The cases show how consultants and team should be able to engage in the activities of imagining what might be rather than what is, for example, through abductive reasoning and hermeneutic pragmatism (Dong et al., 2016; Verganti, 2017). As a consequence, the capability to focus on identifying socio-cultural trends and narratives, creating future scenarios as departure points for developing digital design solutions (Micheli et al., 2019) is pointed out to be crucial to foster digital transformation. This clearly emerges from the 9 personas and associated customer journeys that DOING proposed to the Government of Dubai to exemplify the intended solutions is just one example emerging from the cases. In so doing managers leverage the recognition of original patters and associations inspired by the design perspective of abduction but also on the transforming perspective of digital transformation (Warner and Wäger, 2019).

Figure 1 proposes a conceptualization of the above mentioned five different design thinking dynamic capabilities that might foster digital transformation (see Figure 1).

(Insert Figure 1 about here)

In connecting the five emerging design thinking dynamic capabilities with theories, the above discussion pointed out three main contributions. First, they enrich the understanding of design thinking as a set of dynamic capabilities and not as a simple sequence of phases and tools (Micheli et al., 2019; Liedtka, 2020). Second, they inform how a design thinking perspective over the capability might reinforce the effectiveness of a digital transformation (Cankurtaran and Beverland, 2020). Third, answers to the recent calls of how and why firms should embrace more and more hybrid approaches to foster innovation (Cooper and Sommer, 2016).

Design thinking is traditionally seen as a design approach transferred to the management field to cope with ill-defined and wicked problems (Brown, 2008). From that moment on, several studies tried to unpack its true nature. Few studies looked at the different approaches that differentiate for the aims and principles underpinning (Dell'Era et al., 2020). Other studies looked at the practice to move from design to design doing and unveil the tools (Micheli et al., 2019). Few recent attempts tried to see the more strategic value of design thinking to create a competitive advantage (Liedtka, 2020; Pham et al., 2021). Our studies followed this last trend in showing how the design thinking approach is grounded on a set of dynamic capabilities influenced by the scope, e.g., digital transformation, enriching the understanding of such approach as a more strategic one.

Nambisan et al., 2017, showed how the market and the context influence digital transformation, and the technology is embedded in the transformation thanks to a better configuration. Despite this, no practical guideline is proposed on leveraging the complex system surrounding embedding contextual factors in the transformation. Warner and Wäger, 2019, stated that dynamic capabilities could be valuable in the digital environment to foster digital transformation. Still their research, despite pointing them out for business model innovation environment, does not highlight the role of the environment and customers in making it doable. Thus, our paper, by leveraging the design thinking approach deeply rooted in empathy, reframing, speculating, and criticizing principles, proposes a set of design thinking dynamic capabilities that reinforce the centrality of dynamic capability in creating competitive advantage (Teece, 2007) but

also in proposing how design thinking might make dynamic capability more effective in the context of digital transformation. Indeed, by focusing on user needs, the findings answer the recent calls of Arbesman, 2016.

Finally, the paper is proposing a combined view of design thinking (Brown, 2008), a social science approach, with dynamic capabilities (Teece, 2007), a strategic approach, informs academics on the value that hybrid models and intertwined views can have in the pursuit of innovation and digital transformation. The spread of hybrid approaches (Cooper and Sommer, 2016) from software development to new product development is only one of the potential futures of such hybridization. In following this trend, our paper tries to build on the growing relations that design, and strategy fields are foreshadowing.

6. CONCLUSIONS

This qualitative analysis sheds light on the role of design thinking dynamic capabilities in capitalizing on digital technologies' opportunities. In particular, our qualitative study identifies new and thus far unexplored design thinking dynamic capabilities that enable digital transformation in a business-to-business environment, the consulting one.

This study offers several contributions. First, by qualitatively exploring how digital technologies are valorized in digital transformation projects by leveraging design thinking dynamic capabilities, our empirical results advance current understanding of which dynamic capabilities are relevant in design thinking, a somewhat neglected aspect in existing literature (Carlgren et al., 2016; Micheli et al., 2019). Second, we advance knowledge on digital transformation, especially on the process, methods, and practices relevant when digital technologies are introduced in the market to respond to user needs (Nambisan, 2017). Third, the analysis of the four cases enriches the current understanding of dynamic capabilities (Teece, 2012) by showing how these should be adapted when dealing with digital transformation and by leveraging a design thinking approach. Indeed, the four projects highlight that the internal and external capabilities changed dynamically in response to the different phases of the projects. Moreover, it enhances the understanding of the adoption of design thinking dynamic capabilities in the business-to-business environment. It unshadows how consulting firms adopt this set of capabilities to facilitate digital transformation projects and deliver higher value to the end-users.

Finally, the study provides managers with insights into enhancing the opportunities that digital technologies offer in digital transformation projects by adopting different design thinking dynamic capabilities. The capabilities previously reported are valuable for managers facing the introduction of

digital technologies in solutions. Indeed, through the design thinking dynamic capabilities pointed out above, they can better craft the final solution by situating the value for users at the center instead of the technical functionalities. Furthermore, this study opens up new areas of investigation through combining the design thinking, digital technologies, and dynamic capabilities research streams, suggesting future studies aimed at understanding the intertwined relationships existing and emerging within them.

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Table 1. Overview of the case studies

Project Name	Consulting Organization	Client	Project Objectives
MyGenerali	<p>Design Group Italia Design innovation consultancy with a 50-year track record of creating value for local and global companies. Their offices are in Milan and New York. They work in several industries ranging from healthcare, consumer goods, tourism to technology, with a diverse group of clients including Italian classics, Silicon Valley start-ups, non-profits, and global Fortune 500 companies.</p>	<p>Generali Italia SpA Generali Group is an insurance company founded in 1831 in Trieste, Italy. Born with an intrinsic European spirit, the company, with more than 70 billion of insurance premiums gathered, is one of the most important insurance companies in the world, present in 60 countries with 76,000 employees and 55 million clients.</p>	Health services based on artificial intelligence aimed at enhancing the welfare of employees.
iDubai	<p>DOING by Caggemini DOING is a Digital Agency part of Caggemini, with 4 offices, of which 1 in the United Arab Emirates, a turnover of 29 million euro, more than 200 employees and an international network formed by the best independent agencies in the world, one of the largest Italian players in the digital environment. DOING combines data analysis, service design, creativity and content technology to offer its customers the best marketing, communication, digital transformation, and data solutions.</p>	<p>Dubai SME Established in 2002, Dubai SME was created as an integrated division of the Department of Economic Development (DED). It was developed as a resource for support, information, and outreach for the growing SME sector, promoting innovation and leadership across all segments and guiding entrepreneurs through the steps of starting their own enterprise.</p>	Directory based on big data of local SMEs, owned by the Department of Economic Development.
MaintenanceApp	<p>IBM iX With a history of 107 years, IBM is an innovation leader serving companies and organizations throughout the world. It operates in 175 countries with about 380,000 employees. The turnover for 2017 was 79.1 billion dollars coming from cognitive, artificial intelligence, cloud, security, and mobile solutions. IBM iX (Interactive eXperience) offers creative solutions for business strategy and experience design to solve complex business challenges.</p>	<p>Snam Snam is Europe’s leading gas utility. It builds and manages sustainable and technologically advanced infrastructures, guaranteeing energy security for over 75 years. Snam operates in Italy and, through subsidiaries, Austria (TAG and GCA), France (Teréga), and the United Kingdom (Interconnector UK). Since 2001, Snam is a public company listed on the Italian Stock Exchange FTSE MIB index.</p>	Workspace aimed at acquiring and analyzing big data supporting maintenance activities.
WindTreBusiness	<p>Triplesense Reply A creative and design consulting agency that helps companies manage change and obtain the best benefits from digital transformation. They aim at improving interactions between people and products through creativity, with a user-centered approach to design and digital communication. They bring together the services of a big international group with the versatility of dynamic reality.</p>	<p>Wind3 Italian telecom founded in 2016 after a joint venture between Wind and 3, two main players in the market. With revenues of around 6.1 billion euro, the group is the first mobile operator in Italy, with 30% of the entire market, and third in the fixed telephony market. The company is now involved in the revolution of 5G and digital solutions, with an active role among industries.</p>	Chatbot based on artificial intelligence aimed at improving lead identification.

Table 2. Data collection

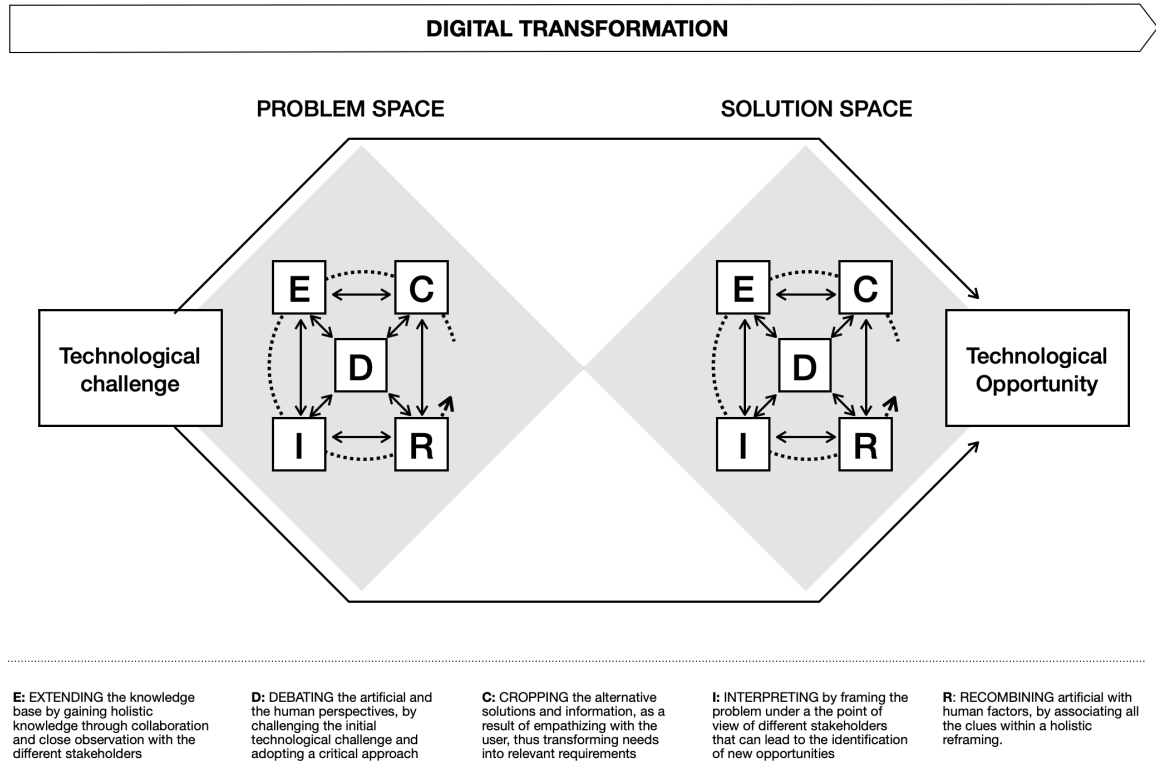
Project Name	1st Wave Interviews	2nd Wave Interviews
MyGenerali Design Group Italia	Psychologist-Design Research Director (04/02/2019; 3h) Partner-Industrial Service Design Director (04/02/2019; 2h)	Lead Service Design (22/02/2019; 2h) UX/UI Team Manager (22/02/2019; 1.5h) UX Designer (22/02/2019; 1.5h)
iDubai DOING by Capgemini	Head of Service Design (26/11/2018; 2.5h) Strategy and Consulting Director (26/11/2018, 2.5h)	Head of Service Design (25/02/2019, 2h) Design Client Director (25/02/2019, 2h)
MaintenanceApp IBM iX	Customer Engagement & Design Italy Lead (04/02/2019, 3h) Enterprise Design Thinking Chapter Lead (04/02/2019, 2h)	Managing Consultant (25/02/2019, 2h) IT Solution Architect (25/02/2019, 1h) Enterprise Design Thinking Chapter Lead (25/02/2019, 2h)
WindTreBusiness Triplesense Reply	Associate Partner (26/11/2018, 2h) Senior Manager (26/11/2018, 3h)	Senior Manager (21/02/2019, 3h) Digital Marketing Planner (21/02/2019, 2h)

Table 3. Cross-case evidence for the design thinking dynamic capabilities

Welion Design Group Italia	WindTreBusiness Triplesense Reply	HiDubai DOING part of Capgemini	MaintenanceApp IBM iX	Design Thinking Dynamic Capabilities
UX Designer: <i>"Each person brought their cumulated experience to the table, as they joined previous searches and personal interests."</i>	Digital Marketing Planner: <i>"At the beginning of the project, we collaborated closely with the marketing specialists from Wind3 Business. [...] We brainstormed together, to build a shared knowledge, which ultimately gave us the possibility to set objectives and clarify also the way to reach them."</i>	Design Client Director: <i>"Talking about Big Data and predictive analytics and working on them to create a service are two totally different things. We needed to learn more about them to understand what we could really do with them."</i>	Enterprise Design Thinking Chapter Lead: <i>"The design thinking sessions allowed us to understand more on the core issues perceived by different stakeholders."</i>	EXTENDING through the close collaboration and observation of the stakeholders, the consultants were able to enlarge their knowledge base on the opportunities and requirements for the technology
UX Designer: <i>"We searched for the technologies [...]. In our search, we focused on the relationship between the technology and the problems of the employees. Hence, we didn't strictly stop at the functionalities of the technologies."</i>	Senior Manager: <i>"We challenged Wind3Business specialists in imagining alternative interactions between users and artificial/human operators."</i>	Head of Service Design: <i>"Initially, the client was merely looking for a [...]. Thanks to the human-centered perspective, we completely changed the approach and instead of starting from the data available we started from the users and their needs. "</i>	Senior Digital Strategy Consultant: <i>"Align the three souls is for us the added value of Design Thinking. We never sacrifice concreteness for methodology, and it means to align each time Business, Functionality and Desire of client: this is what we want to reflect in our team."</i>	DEBATING the artificial and the human perspectives, by challenging the initial technological challenge and adopting a critical approach
Lead Service Design: <i>"Users' behaviors really define what the IT has to develop, in terms of architecture of service and technology, in order to start with effective creation of the service."</i>	Senior Manager: <i>"The insights from the final users helped us understand the true potential behind this service, it convinced Wind3 that the service could go beyond lead generation, because what clients really wanted was help."</i>	Design Client Director: <i>"These personas led us to the identification and selection of the most relevant evaluation criteria for SMEs"</i>	Senior Digital Strategy Consultant: <i>"The collaboration with the users and definition of user stories allowed us to emphasize some requisites. Thanks to user stories, we overcome older methods to get to the requisites, typical of technical teams. "</i>	CROPPING the alternative solutions and information, as a result of empathizing with the user. In fact, only the solutions and features that are relevant to the final user are retained.
UX Designer: <i>"we started to observe several employees of Generali with new eyes. The idea was to investigate their feelings and expectations towards the welfare services that could be provided by Welion."</i>	Senior Manager: <i>"We eventually decided to change our perspective [...] we included people working in B2C, so people who worked constantly with the final users. This allowed us to collect different points of view about the same service."</i>	Design Client Director: <i>"companies for interviews or ethnographic researches were called in order to mitigate the cultural distance and collect from people the most reliable insights possible in order to create basis for service."</i>	Enterprise Design Thinking Chapter Lead: <i>"We created draft user stories in order to properly look at the same process from different perspectives".</i>	INTERPRETING by empathizing with the final user, thus framing the problem under a different perception lens that can lead to the identification of new opportunities.
UX/UI Team Manager: <i>"Opportunities provided by digital technologies such as artificial intelligence and internet of things devices result from the harmonization with people's life."</i>	Digital Marketing Planner: <i>"So, when we developed the conversation tree, we tried to mix artificial and human operators, alternate problem solving and marketing features."</i>	Design Client Director: <i>"We needed to combine the information from the dataset with new information, more 'human' information."</i>	IT Solution Architect: <i>"They (consultants) were fundamental to combine the concepts in an operational form thanks to their capabilities in empowering each of us, with our own capability and knowledge."</i>	RECOMBINING artificial with human factors, by associating and all the clues within a holistic reframing.

Figure legends

Figure 1. Design thinking dynamic capabilities to foster digital transformation



Appendix 1. Check-list of the 1st wave interviews

- How do you apply the design thinking approach in consulting projects?
- What are the principal frameworks and practices you apply in consulting projects based on design thinking?
- What are the typical deliverables you develop in consulting projects based on design thinking?
- How do you compose the team (consulting and client side) in consulting projects based on design thinking?
- How do you apply the design thinking approach in consulting projects characterized by digital technologies such as artificial intelligence, big data, internet of things, blockchain, etc.?
- Do you differently shape design thinking frameworks and practices in consulting projects characterized by digital technologies such as artificial intelligence, big data, internet of things, blockchain, etc.? How?
- What are the particular design thinking deliverables you develop in consulting projects characterized by digital technologies such as artificial intelligence, big data, internet of things, blockchain, etc.? How?
- Do you differently compose the design thinking team (consulting and client side) in consulting projects characterized by digital technologies such as artificial intelligence, big data, internet of things, blockchain, etc.? How?

Appendix 2. Check-list of the 2nd wave interviews

- How did you brief (and debrief) the challenge described by your client in the consulting project based on artificial intelligence/big data?
- How did you develop the *discover phase* in the consulting project based on artificial intelligence/big data?
- What were the specific challenges you faced during the *discover phase* in the consulting project based on artificial intelligence/big data?
- How did you develop the *define phase* in the consulting project based on artificial intelligence/big data?

- What were the specific challenges you faced during the *define phase* in the consulting project based on artificial intelligence/big data?
- How did you develop the *develop phase* in the consulting project based on artificial intelligence/big data?
- What were the specific challenges you faced during the *develop phase* in the consulting project based on artificial intelligence/big data?
- How did you develop the *deliver phase* in the consulting project based on artificial intelligence/big data?
- What were the specific challenges you faced during the *deliver phase* in the consulting project based on artificial intelligence/big data?