



**DEPARTMENT OF
APPLIED IT**

UNDERSTANDING HOW PLATFORM TECHNOLOGY TRANSFORMS DENTAL SPECIALTY CONSULTATIONS

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Abstract

Like many other industries, dentistry is undergoing a digital transformation. New technologies are influencing the work practices of dental professionals and specialists. Digital platforms, in particular, are becoming more omnipresent. The focus of this study is to explore platform technology's impact on dental specialty consultations.

To this end, we used Vial's (2019) framework as our analytical lens to carry out a qualitative case study of dental specialty consultations. Specifically, we focused on analyzing the changes in consultation practice as a result of implementing platform technology. The data collection consisted of semi-structured interviews with dental practitioners, specialists, and the platform owners. We analyzed the findings using a deductive thematic analysis, which yielded three principal conclusions.

First, the workflow of conducting dental specialty consultations has been digitalized, but not changed in a transformative way. Thus, the workflow is still the same, but it is now carried out digitally via the platform. Second, the platform technology has introduced the platform owner as a new key player in the ecosystem, which now orchestrates the transactions between specialists and dental practitioners. Third, the platform implementation has resulted in substantial time savings for dental practitioners and specialists leading to quicker patient care responses and increased patient capacity.

Our study enriches the digital platform and digital transformation literature by illustrating how platform technology is part of a digital transformation process. Additionally, we provide insights for dental practitioners and specialists who are increasingly using platform technology in their consultation practices.

Keywords

digital platforms, digital matchmaking, digital transformation, dental specialty consultations

Foreword

First and foremost, we would like to thank our supervisor Dina, who has continuously delivered constructive feedback and meaningful insights at every step of the way during this process. Despite being in the midst of adapting to a global pandemic, Dina has been fully engaged and always shown genuine interest in our work.

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1 Introduction

Digital transformation (DT) is a widely researched topic in the field of information systems and a vital matter for practitioners across most industries (Vial, 2019; Bhardwaj et al., 2013; Fitzgerald et al., 2013). One sector that has increasingly been embracing DT is dentistry (Herrmann et al., 2018; Clough & Patel, 2018). Still, the progress is slow, as practitioners struggle to adopt and adapt to new technologies. As a result, they are unable to harness the power of technology, which, in turn, makes transformation even more challenging (Matthews et al., 2016; Acharya et al., 2017; van der Zande et al., 2017). Further complicating the digitalization process, practitioners must continue to adhere to healthcare industry patient information safety regulations and standards (Kane, 2015; Herrmann et al., 2018). However, one technology that presents an opportunity to align with these standards are digital platforms (Tiwana, 2014; Parker et al., 2016).

In recent years, digital platforms and related aspects of the platform economy have become an important part of the business model discourse (Tiwana, 2014; Parker et al., 2016; Jha et al., 2016) leading to a conversion from classic “pipeline markets” to “platform markets” (van Alstyne et al., 2016). A common non-technical definition of a digital platform is the connection of various actor groups via a technological platform (Boudreau & Hagiu, 2008; Koh & Fichman, 2014; Ye et al., 2012) that is more advantageous than a traditional business model (Pagani, 2013). Digital platforms now play a central role in DT as an interface across most markets and industries (Parker et al., 2016; Li et al., 2018; Hänninen et al., 2018; Vial, 2019).

One specific area within the dental sector where digital platforms are beginning to impact practice and stakeholder relationships is *specialty consultations*. The dental industry is a broad field covering areas such as diagnosis, prevention, and treatment of oral diseases (Dorfman et al., 2018). One practice that has increased in recent years is the use of X-ray¹ and CBCT² diagnostics (Newaz et al., 2015), also referred to in this study as specialty consultations. In Sweden and Norway, specialty consultations are traditionally conducted in an analog process in which radiology referrals and other treatment documents are sent through regular post service or email (Clough & Patel, 2018). However, this workflow no longer adheres to patient safety requirements such as GDPR (Regulation (EU) 2016/679). Digital platforms, which facilitate transactions between different actors, offer an alternative way of conducting specialty consultations.

¹ X-ray: Radiographic image of the dental area with a common standard of two dimensions (2D).

² CBCT (Cone Beam Computed Tomography): Technology to produce a three-dimensional (3D) radiographic image of the teeth, oral, and maxillofacial region (neck, jaw, mouth) as well as nose, ears, and throat.

Several authors (Spagnoletti et al., 2015; Asadullah et al., 2018; de Reuver et al., 2018) indicate that the phenomenon of digital platforms is relatively under-researched in the field of information systems and still underdeveloped in practices such as dentistry (Biswas et al., 2014; Kaye, 2018; Shetty et al., 2018). Moreover, few studies focus on how platforms are part of DT (Sebastian et al., 2017; Hossain & Heidemann Lassen, 2017; Hänninen et al., 2018; Hinings et al., 2018). Accordingly, there are calls for further research on how digital platforms are transforming industries (de Reuver et al., 2018).

The objective of this study is to explore the implications of implementing platform technology within dentistry. Specifically, this thesis aims to answer the following research question:

How does platform technology transform dental specialty consultations?

To investigate this research question, we designed an exploratory case study with a special focus on understanding how platform technology affects the ability of dental practitioners and specialists to conduct specialty consultations digitally. The case study showed a multi-level perspective of the three involved actors: dental practitioners, specialists, and the platform owner. Dental practitioners refer to dentists and oral surgeons. Specialists refer to the oral specialists that provide consultations to the dental practitioners. Platform owners manage and administer the platform through which dental practitioners and specialists are connected. Using Vial's (2019) framework, our study contributes to DT research as we also assess how this framework is useful to guide the DT processes.

We structure the remainder of our work as follows: First, we outline the theoretical background and propose the conceptual framework. Second, we describe the method and research process. Next, we present the study's results. Finally, we discuss our results in light of the literature alongside limitations and suggestions for further research.

2 Related Work

In this section, we outline the theoretical background of our study. First, we describe the phenomenon of DT and delve more specifically into current DT efforts in dentistry. Second, we describe digital platforms and their role as matchmakers.

2.1 Digital Transformation

DT is a phenomenon that has been attracting a great deal of interest in the last decade among both practitioners (Liu et al., 2011) and information systems researchers alike (Majchrzak et al., 2016; Kane et al., 2016; Vial, 2019). Despite the accelerated interest in the topic, there is still no comprehensive understanding of its nature and implications (Matt et al., 2015; Vial, 2019) or an agreed definition of the concept (Fitzgerald et al., 2013; Piccinini et al., 2015; Kane, 2017). Recently, Vial (2019) has made an attempt to provide a synthesized definition. He describes DT as a “process where digital technologies create disruptions triggering strategic responses from organizations that seek to alter their value creation paths while managing the structural changes and organizational barriers that affect the positive and negative outcomes of this process” (ibid, p. 1). Further, given the observation that DT is quite different from IT-enabled transformation, makes it clear that it is a complex and disruptive process (Kane et al., 2019; Skog, 2019), involving a range of actors and blurred boundaries (Nambisan et al., 2017).

In organizations, DT takes place at different levels (Schwarz Müller et al., 2018) and is driven by today’s rapidly changing environments that require organizations to exploit and integrate new digital technologies (Fitzgerald et al., 2013; Skog, 2019). These technologies can optimize processes and improve the organizational performance (Hess et al., 2016) as well as facilitate a new way of interconnectedness and recombination of businesses, services and people on an industrial and societal level (Iansiti & Lakhani, 2014; Agarwal et al., 2010). Therefore, a successful DT changes the path-dependent core business of an organization (Skog, 2019). Within this context, Kane et al. (2015), emphasize that DT is about a human-centered approach and strategy to facilitate an organizational culture and structure that is more agile and adaptive to stay competitive (Kane, 2017). It requires organizations to involve their employees in the DT process and to manage behavioral changes (Meffert & Swaminathan, 2018). Without this involvement, resistance could arise (Matt et al., 2015).

According to Andriole (2017), resistance is particularly evident in people who feel comfortable in the organization and, therefore, often do not want to make any changes. However, resistance can be seen as a resource as it can provide top man-

agement with valuable feedback on how to proceed (Ford & Ford, 2009). The management needs to continuously support the process with an early commitment of the stakeholders and ensure effective communication during the course of activities (Andriole, 2017; Reynolds, 2018). Vos and Rupert (2017), therefore, refer to internal or external change agents that can be introduced to facilitate, coordinate, and lead the efforts. According to Armenakis and Harris (2001), change agents should aim for persuasive communication, active participation, and internal and external information management to create change readiness and stimulate the change progress.

Rothwell et al. (2016) emphasize that the growth and sustainability of an organization is dependent on its ability to change and transform. For this transformation, Matt et al. (2015) suggest developing a DT strategy in alignment with other functional and organizational strategies. Compared to traditional IT strategies that tend to primarily concern the IT infrastructure management, DT strategies arise from the business perspective (Bharadwaj et al., 2013) and focus on product- and customer-centric approaches with a transformation of processes, products, and structural aspects that come along with the new digital technologies. However, according to several studies (Fitzgerald et al., 2013; Hess et al., 2016; Gale & Aarons, 2018), organizations often lack the urgency of a transformation, resulting in a slow processing of behavioral and technological changes. Such is the case in dentistry (Agarwal et al., 2010; Herrmann et al., 2018).

2.2 Digital Transformation in Dentistry

The digitalization of dentistry started in the early 2000s (Bauer & Braun, 2000), but has progressed slowly (Agarwal et al., 2010; Herrmann et al., 2018). Nevertheless, dental practitioners increasingly integrate digital radiology, intra- and extra-oral scanners, CBCT, 3D printing, digital platforms, and digital health records into their practice (Fredrickson, 2013; Gallucci et al., 2019). These technologies are mainly driven by the dental industry and pave the way for professionals to profoundly change their processes and digitalize workflows (Shetty et al., 2018). Unfortunately, it is currently not possible to send digital health records with patient information to all caregivers, including dentists, indicating that more connectivity among the healthcare providers is required (Kane, 2015). Furthermore, Shetty et al. (2018) suggest that dental practitioners need to start focusing on a consumer-driven approach using mobile and social media technologies and also begin analyzing the data, which is generated by, for example, wearables and smartphones.

The DT process also generates novel conflicts for dental practitioners. For example, van der Zande et al. (2013) reveal that whereas dental practitioners have more motivation and enjoyment when using digital technologies, the adoption of certain tech-

nologies is hindered by barriers such as the investment, usability, frequency of treatment performance, and the skill and mindset of the user. Thus, the utilization of digital technologies tends to be higher in larger dental clinics (ibid.). However, compared to other industries, this sector has more restrictions due to regulations in terms of data integrity, data flows, audit, and quality, as well as security aspects that need to be considered (Kane, 2015; Herrmann et al., 2018). In addition, Kane (2015) explains that most of the managers in healthcare have no knowledge about the IT they need, and, therefore, cannot integrate it sufficiently as part of their DT strategy.

2.3 Understanding Digital Platforms

Definitions of digital platforms can be found in a variety of literature fields (Asadullah et al., 2018). Rochet and Tirole (2003) explain platforms as services, products, institutions, or firms that facilitate transactions between two or more user groups. Koh and Fishman (2014, p. 977) define digital platforms as “two-sided networks that facilitate interactions between distinct but interdependent groups of users, such as buyers and suppliers”. Simplified, a platform creates and captures value through connecting demand and supply actors in a self-reinforcing network. By contrast, a linear pipeline business minimizes marginal costs by streamlining the design, production, and selling of products (Van Alstyne et al., 2016). Famous examples of platform businesses are newspapers, shopping malls, and credit cards, where a platform owner connects preexisting actors such as: journalists/readers, shops/consumers, banks/consumers (Van Alstyne et al., 2016; Eisenmann et al., 2006). In our study, we use the terms digital platforms and platform technology as equivalent to each other.

Information technology and global digitalization have made it possible to develop digital platforms that can transform industries (de Reuver et al., 2018; Asadullah et al., 2018). As displayed in Figure 1, Van Alstyne et al. (2016) outline the basic architectural structure of platforms comprised of four actors: (1) platform owners who control their intellectual property and governing structure; (2) providers, which are the platforms’ interface towards users; (3) producers who generate the offerings; and (4) consumers who utilize those offerings.

Van Alstyne et al. (2016) show that a platform consists of a base structure in which the platform owner acts as a provider and intermediary between producers and consumers within a market. The exchanges and connections established between producers and consumers take place through the base structure provided by the platform owner.

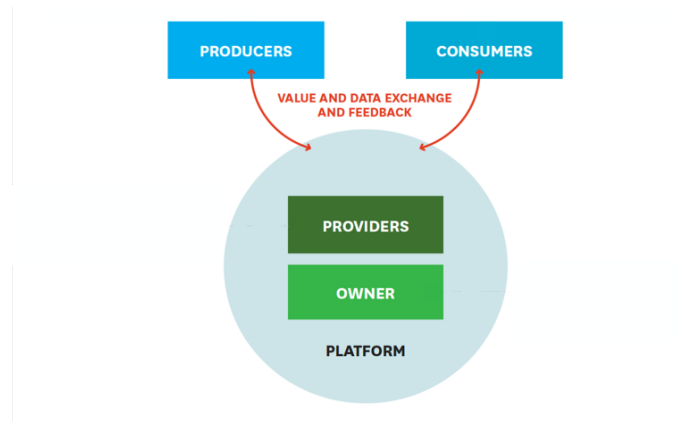


Figure 1. The Players in a Platform Ecosystem (Adapted from Van Alstyne et al., 2016).

A platform's main asset and resource is the network comprised of producers and consumers and its ability to orchestrate transactions between these participants (Van Alstyne & Parker, 2017; Van Alstyne et al., 2016; McIntyre & Srinivasan, 2017). Through successful resource orchestration, platforms create value by facilitating the interactions and transactions between the actors within the network (Van Alstyne & Parker, 2017). The value of a platform business grows as the network ecosystem grows through an “iterative, feedback-driven process”, often occurring through network effects (Van Alstyne et al., 2016). Platform networks can also join together to create new or added value to a service or product. The concept of generativity has been defined as “the ability of a technology to generate new outcomes driven by large and heterogeneous users” (Asadullah et al., 2018, p.5).

The term network effects explain the increase in usefulness of a process, service, or product as the installed base of users grows and, consequently, boosts the total value of the network as a whole (Katz & Shapiro, 1985; Shapiro & Varian, 1998). For example, a large base of consumers can generate positive network effects in terms of motivating producers to join a platform (de Reuver et al., 2018). For platform owners, generating and capturing value from their platform is thus contingent upon their ability to create positive network effects (Dattée et al., 2018; Eisenmann et al., 2006). Not only do network effects provide benefits for new users, but they also can result in better pricing and higher quality of service or product for existing users (Dew & Read, 2007).

Network effects can be same-side effects, where increasing the number of users on one side generates a higher or lower value for other users on the same side of the market (Van Alstyne & Parker, 2017; Eisenmann et al., 2006). In cross-side network effects, a growing number of users on one side increases the usability or value for users on the opposite side. All types of network effects can be positive or negative. This means there can be an increase or decrease in value as more or less users are active (Eisenmann et al., 2006). For instance, television viewers can perceive an excess of commercial breaks as a negative effect (ibid.).

2.4 Digital Platforms as Matchmaker

One main asset of platforms is their ability to connect distinct types of participants in an ecosystem. In such ecosystems, platform providers become the intermediaries facilitating the transactions between the users and producers (Van Alstyne & Parker, 2017; Van Alstyne et al., 2016; McIntyre & Srinivasan, 2017). This ability to orchestrate transactions and establish the right connections between users and producers make platform providers akin to matchmakers. Ivarsson and Svahn (2020, p. 5932) define the process of matchmaking as a “process of complex resource allocation where firms are intermediaries of supply and demand between actors in an ecosystem”. Contrary to traditional pipeline businesses in which focus is placed on designing, producing, and selling products, matchmaking firms operate in a less linear value chain manner (Ivarsson & Svahn, 2020). Whereas a pipeline firm’s interest is most commonly placed on the refinement of resources and stimulating economies of scale in terms of supply, matchmaking firms attempt to stimulate economies of scale in terms of demand (ibid.). This implies that matchmaking firms operate to foster and capture the value created between supplying and demanding opposites within a given context, such as a marketplace (Ivarsson & Svahn, 2020; Roth, 2015).

The “who gets what and why” all fit within the boundaries of a marketplace (Roth, 2015). Marketplaces can involve matching buyers with sellers, employers with employees, and so forth. However, Roth (2015) claims many industries are shifting from traditional economic thinking, where price is the determining factor conditioning all potential exchanges, into matching markets where price is not the main factor. Taking college and labor markets as an example, the author explains that both exist in a two-sided market where “searching and wooing” are true for both sides and where price is not the conclusive factor (ibid.). Rather, it is a process of matching the desires of the one side with the abilities of the other side. According to Roth (2015), matchmaking typically occurs in a structured environment, such as through the application process.

As depicted in Figure 2, there are two main transaction types within matchmaking: brokering and orchestration (Ivarson & Svahn, 2020). Both transaction types connect actors within an ecosystem dependent on each other for collective affluency.

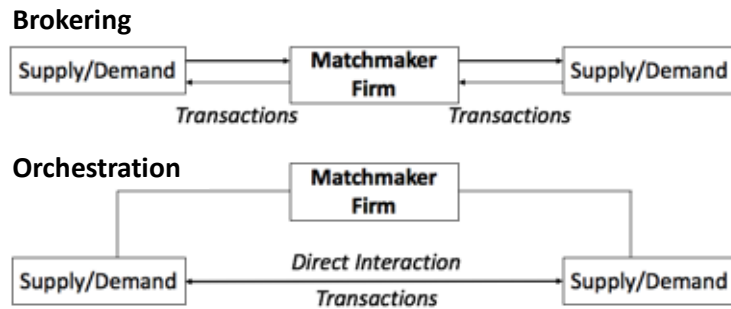


Figure 2. Brokering v.s. Orchestration Matchmaking (Ivarsson & Svahn, 2020).

Brokering indicates that the matchmaking firm participates actively in a transaction process, whereas orchestration implies that the firm takes on a more “passive” role by creating conditions that allow actors to interact directly with one another (ibid.). Furthermore, Nambisan et al. (2017, p.230) discusses orchestration as “the matching of problems and needs with potential solutions”. Digital technologies enable such orchestration and make it possible to scale (ibid.). Similarly, Ivarsson and Svahn (2020) explain digital platforms as multi-sided markets that are used by firms for digital matchmaking.

Ivarsson and Svahn (2020) outline four principles of digital matchmaking that apply to both brokering and orchestration: (1) relationship building; (2) mobilizing for innovation; (3) governing transactions; and (4) curating matches. (1) Relationship building involves reducing barriers for the use of technology, promoting engagement, and reducing the perceived risks associated with “faceless” interactions. (2) Mobilizing for innovation includes promoting generative exploration, having open architectures, and establishing cross-industry collaboration (ibid.). (3) Governing transactions refers to a digital matchmaker’s ability to orchestrate matches and resources, have a dynamic pricing model, and incentivize actors within the ecosystem to utilize the service. Finally, the principle of (4) curating matches concerns the way a matchmaker matches actors or resources to one another within an ecosystem. Data analytics and algorithmic matching, for example, can aid a matchmaking firm in this process (ibid.).

3 Conceptual Framework

This section describes the conceptual framework that guides our study and analysis of the transformation of dental specialty consultations through platform technology. It is based on Vial’s inductive framework “Building blocks of the DT process” (2019). The framework contains eight high-level building blocks that summarize the author’s analysis on the extant literature on DT. This framework captures a wide range of aspects related to DT as a process, both on a societal and organizational level. The building blocks reflect the central aspects and the arrows support their associated relationships to each other.

We chose this framework due to the broad yet detailed coverage which provides a solid and holistic guideline for understanding DT processes. Furthermore, Vial’s framework is arguably the most contemporary of its kind since being published in the later half of 2019. For purposes of our study, we have adapted the framework and collapsed the building blocks’ positive impacts and negative impacts into one block. Figure 3 shows the adjusted framework with its building blocks consisting of *disruptions*, *strategic responses*, *use of digital technologies*, *changes in value creation path*, *organizational barriers*, *structural changes*, and *positive and negative impacts*.

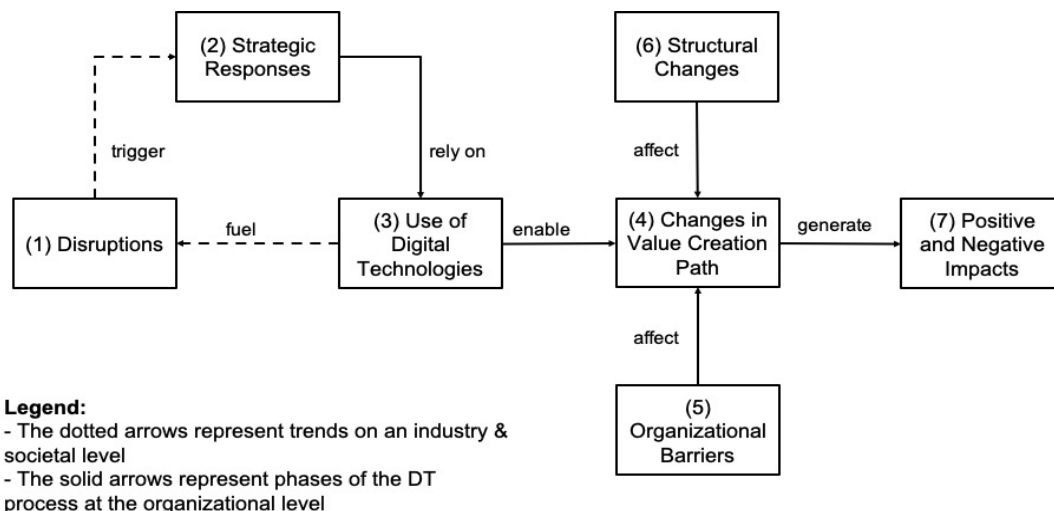


Figure 3. Adapted Building Blocks of the DT Process (Adapted from Vial, 2019).

Disruptions. Digital technologies can cause disruptions on an industrial and societal level. Vial’s (2019) findings show three areas of disruptions. First, the changing consumer expectations and behaviors that arise as customers become more active participants through the use of, e.g., mobile apps or social media cause disruptions. Second, digital technologies disrupt the competitive landscape by accelerating new types of digital offerings when (re)combining existing services or products (Tiwana et al.,

2010). Third, digital technologies increase the generation and availability of data and thus offer new potential for organizations (Vial, 2019).

Strategic responses. Triggered by the inherent disruptions of digital technologies, organizations are forced to react strategically to remain competitive. In this light, the concepts of DT strategy and digital business strategy have emerged (Vial, 2019). With a business-centered approach, the DT strategy refers to the “focus on the transformation of products, processes, and organizational aspects owing to new technologies” (Matt et al., 2015 p.339). The digital business strategy is described to as an amalgamation of business and IT strategy and specified by Bharadwaj et al. (2013, p. 472) as “organizational strategy formulated and executed by leveraging digital resources to create differential value”.

Use of digital technologies. Digital technologies relate to the categories cloud, mobile, analytics, social media, the internet of things, and platforms. They are important initial aspects of DT as they trigger transformational processes (Sebastian et al., 2017; Tan et al., 2015). Organizations can use them stand-alone or in a combination of technologies. One main impact of their use is that they facilitate a new path for value creation.

Changes in value creation path. Value creation is a leading aim of any organization, as the generated value is determined by an organization’s performance and competitive advantage (O’Cass & Ngo, 2011). Due to digital technologies, the most common changes within the value creation process are the establishment of a new value proposition, the redefinition of value networks, new value channels, and a higher agility, as well as ambidexterity to faster adapt to environmental changes. For example, platforms create new values by facilitating the interaction between the distinct types of participants that use the platform and develop an ecosystem together (Hänninen et al., 2018). This also redefines the value network where the platform is used for the coordination and collaboration among participants (Andal-Ancion et al., 2003).

Organizational barriers. Factors that hinder change in value creation processes and digital transformation are resistance and inertia accounted for in the building block organizational barriers. First, employees can express resistance to using digital technologies when they are introduced (Vial, 2019). Such resistance can be due to, for example, the fact that the potential advantages are not clearly shown (Svahn et al., 2017). Second, it is important to overcome the inertia of well-established structures, capabilities and resources that can occur, for example, in an existing economic relationship between two or more parties (Vial, 2019).

Structural changes. To change the value creation path, Vial (2019) describes four main prerequisites related to structural changes: an organizational structure that facilitates cross-functional collaboration; an organizational culture that is oriented towards innovative and entrepreneurial characteristics; organizational leadership with new roles that ensures a digital mindset is developed within the firm; and employee skills and roles that become an active part of the current and future digital workforce.

Positive and negative impacts. By digitally transforming the organization, positive as well as negative impacts can be generated. These effects mainly occur at the organizational level in form of increased operational efficiency, cost-savings, and optimization of the business processes. Additionally, DT can result in higher organizational performance, stronger competitive advantage, company growth, improved reputation, increased innovativeness, or improved financial performance (Agarwal et al., 2010; Vial, 2019). Furthermore, digital technologies offer vast potential at the societal and industry level by, for example, improving the individual's quality of life. However, there are also certain negative aspects such as privacy and security concerns linked to the prevalent use of digital technologies (Vial, 2019).

4 Method

This section outlines and details the methodological approach and empirical research setting of our study. With the goal of exploring how platform technology transforms dental specialty consultations, we chose to carry out our study using a qualitative case study approach. We considered this method suitable as it fits the rationale of investigating a contemporary phenomenon in a real-world context and achieves more than surface understanding (Yin, 2009; Zainal, 2007). We gathered the data primarily through both semi-structured interviews and informal conversations and analyzed the data through the use of a deductive thematic analysis (Braun & Clarke, 2006). We chose the deductive thematic analysis as it allowed us to analyze the data following the building blocks of the selected conceptual framework (Vial, 2019). The building blocks were used as themes and to help summarize the key findings of our empirical data (Nowell et al., 2017).

4.1 Empirical Research Setting

For a full understanding of changes that have occurred to the practice of conducting specialty consultations since the implementation of the platform technology, we outline the previous workflow of conducting specialty consultations in the following section. Additionally, we introduce the platform owner Boneprox in closer detail.

4.1.1 Understanding Traditional Dental Specialty Consultation Practice

Specialty consultations are a common daily practice for dental practitioners. However, due to their complexity, these diagnostics legally require an assessment by a specialist in Sweden and Norway (Riksdagsförvaltningen, n.d.; Lovdata, n.d.). If uncertain about, for instance, a potential mucosal change or surgical procedure, the practitioner sends an X-ray or CBCT image to a correspondent specialist for diagnosis and recommendation on care and treatment plans.

Traditionally, this process starts with the dental practitioners that take the X-Ray or CBCT scan of the affected mouth area. Then the dental practitioners save the scanned images on a USB Stick or CD without anonymization and send it by post together with a handwritten consultation. A few days (up to a week) later, the specialist receives the requested consultation. The specialist uploads the images to their computer and carries out the analysis. Then the specialist sends a letter back to the dental practitioner with their recommendation, which is received a few days (up to a week) later. However, in certain cases, for example when the specialist is sick, the dental practitioners are unable to receive a consultation at all. They thus have to refer the patient directly to a specialist clinic. Furthermore, the general data protection regulation (GDPR), which came into effect in May 2018 (Regulation (EU) 2016/679),

requires a secure transfer of patient data and X-Ray/ CBCT images. In response to these regulations and high demand, Boneprox (BPX) launched its digital platform containing dental specialty consultations in 2018.

4.1.2 The Boneprox Platform

BPX is a scale-up³ headquartered in Gothenburg, Sweden with a Norwegian subsidiary. The company currently has three full-time employees and over 100 clinics and three specialists connected to its digital platform across Norway and Sweden. This platform is the first of its kind to facilitate specialty consultations by connecting dental practitioners with the appropriate specialists. Specifically, the platform offers the functions ReferralExpress and CBCT Supervision. Referral Express enables dental practitioners to directly demand a consultation in the areas of radiology, oral medicine (mucosal changes), cariology, and periodontology to the specialist via the platform. Likewise, dentists can also receive a CBCT interpretation from a maxillofacial radiologist by means of the CBCT Supervision function. In addition, the platform contains the Boneprox tool, which is a patented artificial intelligence software used to assess a patient’s risk of osteoporosis by measuring the jawbone structure. Our study refers to the first two categories as dental specialty consultation.

To investigate how platform technology transforms dental specialty consultations, we involved a selection of individuals from each stakeholder group in the empirical setting to gather a holistic perspective from the whole ecosystem as presented in Figure 4.

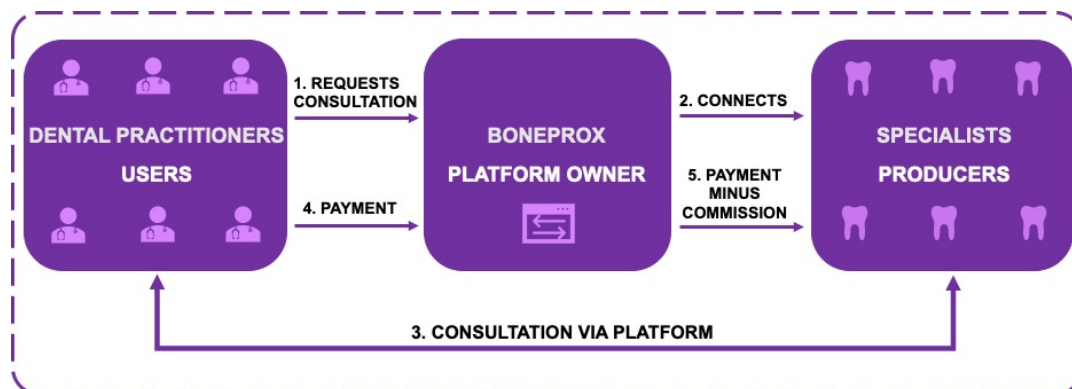


Figure 4. Visualization of the Dental Specialist Consultation Ecosystem

The main stakeholders connected to the digital platform for specialty consultations include dental practitioners, such as dentists and oral surgeons, as consumers, the oral specialists who provide their consultations as a service through the platform, and BPX as the platform owner. Our case study approach focused on the specific practice of specialty consultations between dental practitioners and oral specialists.

³ Scale-up: Refers to a high growth company that has achieved growth of 20% or more in turnover or in employment for over a three year period (OECD & Eurostat, 2008)

4.2 Data Collection

We collected the data through semi-structured interviews and informal conversations. The interviews lasted between 30 and 90 minutes and were carried out via telephone due to the wide geographical distance between many of the clinics' and specialists' locations. All of the interviews were recorded with informed consent from all respondents. As shown in Table 1, we conducted a total of 13 semi-structured interviews. We included eight dental practitioners, two of whom were oral surgeons and six were dentists, one maxillofacial radiology specialist, and one oral medicine specialist, as well as the chief executive officer (CEO), chief financial officer (CFO), and chief sales officer (CSO) from BPX. Four dental practitioner respondents work in Sweden and four work in Norway. One specialist is based in Norway and the other in Sweden (see Table 1).

Table 1

List of Interview Respondents

Respondent	Profession
A	Swedish Dentist
B	Swedish Dentist
C	Norwegian Oral Surgeon & Clinic Manager
D	Swedish Dentist
E	Swedish Oral Surgeon
F	Norwegian Dentist & Clinic Owner
G	Norwegian Dentist & Clinic Owner
H	Norwegian Dentist & Clinic Owner
I	Norwegian Maxillofacial Radiology Specialist
J	Swedish Oral Medicin Specialist
K	CEO of Boneprox
L	CFO of Boneprox
M	CSO of Boneprox

In order to collect meaningful qualitative data, it was deemed important that the interviews were designed as semi-structured since it supports probing into the subject's experiences and perspectives about a given context and topic matter (Hennink et al., 2011). In addition, Donley (2012) highlights the value of following an interview guide of questions to structure the interview and achieve higher reliability and comparability of the data. We divided the interview guides (see Appendix 1) into several category blocks, such as general information, the use of the platform in the daily practice, and the transformation of the value creation process depending on the stakeholder group. These were based on the conceptual framework of our study to help shape the applicability and focus of the questions and thereby the course of conversations with the respondents (Braun & Clarke, 2006).

During the course of our study, we also had ongoing conversations via email and telephone with BPX to attain contact details for dental practitioners and specialists to interview. Furthermore, the informal conversations provided additional information with regards to minor questions that arose relating to, for instance, the platform, technology issues, and BPX's business model.

4.3 Data Analysis

We followed a deductive thematic analysis as described by Braun and Clarke (2006) and Kuckartz (2014) to systematically identify, analyze, and document themes and patterns of the collected data. In general, the thematic analysis offers flexibility and the possibility to methodically support an in-depth and explorative approach (Braun & Clarke, 2006). As a way to prepare for the analysis, we transcribed the interviews to keep the necessary original nature of the information (Edwards & Lampert, 2014).

The first step of the analysis was to read the transcribed interviews and the data of the informal conversations to familiarize ourselves with the data. In doing the first reading, we also highlighted text passages which seemed relevant and which connected to our research question in general. In the second step, we began to code the first interview based on the main thematic categories derived from Vial's (2019) conceptual framework for understanding DT (outlined in Section 3). This was to verify if the chosen themes were applicable (Kuckartz, 2014). In brief, the coding included themes such as the overall usage of the platform, the new value creation, generated impacts, and the current status of digital transformation in dentistry. Together, this coding provided an in-depth view how the platform technology transformed dental specialty consultations. After we made minor adjustments of the themes, in the third step we coded all interview transcripts and informal conversations by going through them section by section in an iterative approach. Sections that did not contain appropriate data for the predetermined topics remained uncoded and we allocated some text passages to multiple categories (Braun & Clarke, 2006).

We coded the text using a multiple coder approach. This means that we initially coded the interviews independently before sorting the results and examining commonalities and discrepancies to reach consensus of the coding (Kuckartz, 2014). After systematizing and structuring the data throughout the coding process, we created a thematic matrix to summarize the results. This allowed us to review the themes and to gain a better overview of a particular person's statements by going along the single rows horizontally and to get a topic-oriented perspective by following a specific column vertically (ibid.).

5 Findings

In this section we present our study's findings, which we structured according to Vial's (2019) building blocks for understanding the DT process. The building blocks should be read as interconnected steps through which the process platform technology's transformation of dental specialty consultations can be identified and understood. We present our findings in order of the building blocks as set forth in the conceptual framework including: *disruptions*, *strategic responses*, *use of digital technologies*, *changes in the value creation path*, *organizational barriers*, *structural changes*, and *positive and negative impacts*.

5.1 Disruptions and Strategic Responses

From the interviews, it was clear that the starting point for the *disruptions* for dental specialty consultation can be attributed to the enforcement of the GDPR-requirements. Consequently, the implementation and adoption of the platform technology reflected in many ways a *strategic response* from the specialists and dental practitioners. The majority of respondents stated that implementing the platform solution is motivated by the inability of their previous workflow to meet GDPR-compliance requirements. Dental practitioners and specialists alike expressed that they found themselves looking for an alternative way of conducting specialty consultations since GDPR came into force in May 2018. The respondents reported that they could no longer use email and non-anonymized USB sticks or CDs as this did not comply with the personal data privacy standards. One respondent said: "*Since GDPR was enforced, I am not able to carry out consultations the way that I used to*" (Respondent J). It was also evident from the respondents that GDPR influenced the strategic decision to implement the platform, since the majority joined the platform a few months after the regulation came into force. Only one respondent had already implemented the initial software for osteoporosis measurements over 10 years ago and has since 2018 also adopted the platform for specialist consultations.

In addition, to the implementation of the platform, the dental practitioners stated that they also invest in new digital hardware such as CBCT scanners to be able to work more digitally and to proceed within their DT process. All respondents agreed that dentistry is currently undergoing a DT and that most developments and changes will occur within the next three to four years. The overall perception is that DT has been progressing very slowly, but has been accelerating over the past two years. One dental practitioner of a larger clinic highlighted:

"We have a long digitalization plan. We now have a database for our intraoral scans, and we have four intraoral scanners. We have that technological exper-

tise at every workstation so everyone can use it. We also have two digital portals where we export and import cloud based. So, we have been doing this plan for 15 years and the first 14 years we maybe did 40-60% and now within the last two years the rest has come into place.” (Respondent H)

Compared to this plan, which was adopted by the larger clinic, it appeared that smaller clinics (up to four employees) do not have as specific plans to pursue a DT strategy. Furthermore, while the dental practitioners displayed an openness and desire for digitalization, a majority confessed that they ‘do not know enough about how to go about it’ in practice. For example, many of them stated that they do not know which areas they can digitalize or whether there are other products or services offered on the market.

5.2 Use of Digital Technologies

With the implementation of the platform as a strategic response, the respondents faced new demands to learn how to make *use of digital technologies* in terms of figuring out how to harness its potential. The respondents reported varying usage rates of the platform technology’s different functions. According to all but one respondent, the most used service was the specialty consultation feature. In their daily practice, four of the respondents use the specialty consultation several times a day, three a few times per week and one respondent only sometimes because they primarily carry out the osteoporosis analysis. The specialist for radiology uses the platform everyday even on weekends, while the other only opens it several times per month due to fewer inquiries. Compared to the analog way of conducting specialty consultations, all respondents stated that they carry out more consultations now.

In addition, a recurrent theme was the importance of receiving continuous support with adopting the platform technology in order to actively make use of it. The respondents highlighted that, due to the efforts of the BPX employees, there has been a natural shift in practice from their previous way of conducting specialty consultations. The respondents described that this process starts with an individual meeting for them and their clinic once they are interested in the service or already subscribed. The platform owner explains the platform technology to the practitioners; its features and benefits, as well as the new digital workflow. After that, the owners keep in close contact with the dental practitioners to follow up and continually gather feedback on their provided features, as well as to help solve problems that may arise of a technical or subject-specific nature.

One owner mentioned that a technical problem can occur, for example, with the image export as the X-Ray machine manufacturers often have different ways of doing it. Therefore, the owners “*have constant contact by email or calls with the dental clinics. If a problem comes up [they] are learning as [they] go*” (Respondent K).

Besides, some dental practitioners also confessed that they have problems in understanding the specialist examinations. Therefore, the owners highlighted that they regularly offer workshops for up to 50 dental practitioners. The so-called “Boneprox Course Day” or “Fika with Boneprox”⁴ allow new and existing customers to get to know the service as well as to enhance their knowledge by learning from a specialist’s presentation about the examination of the X-Ray and CBCT images.

In addition, some of the respondents stated that it was fundamental for them to receive technical training in order to learn how to correctly operate X-Ray and CBCT machines. To address this concern, the platform owners explained that, they offer a teaching course on how to operate these machines in collaboration with one of their specialists and administer the required certification license for the dental practitioners after completion of the course.

5.3 Changes in the Value Creation Path

The use of the platform technology presented above had a large impact on the *value creation path* of the specialty consultation practice. More specifically, the respondents revealed that the platform not only alters the value proposition for their respective customers, but also changes the original value network with the platform owner as new partner, which also plays an important role in the transformation. In the following sections, we describe the new value proposition and the role of the platform owner in the value network in detail.

5.3.1 Creation of a New Value Proposition

While the platform did not transform the workflow of carrying out specialty consultation itself, it clearly changed the way the respondents created value for their respective customers. Figure 5 illustrates the workflow for the respondents when using the platform.

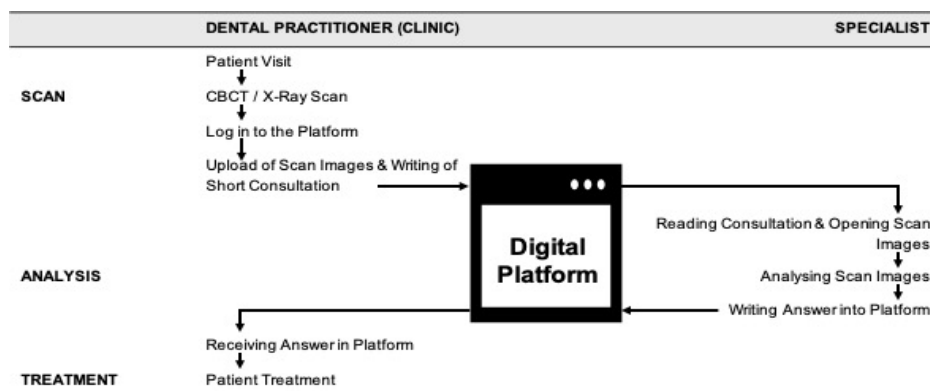


Figure 5. Digital Workflow Between Dental Practitioners and Specialists Using the Platform

⁴ Fika: Swedish word for coffee break

The dental practitioners highlighted that after a patient visits a clinic, they directly upload the scans and write their consultation into the platform. The specialist then receives a notification, examines the images immediately, and types the answer back into the platform. The dental practitioners obtain answers that same day, often within as little as two hours. One dental practitioner stated: *“You can upload pictures very quickly. While uploading the pictures you can write the referral and 2-3 minutes after a patient has left the room the request is sent”* (Respondent C).

This means that the specialists are able to offer an evaluation of the scanned images as a digital service to the dental practitioners that is securely (GDPR-compliantly) transferred. For the dental practitioners, the main value was having one specialist “attached” to the clinic. As a result, which was pointed out by the respondents, this enables them to provide analysis and treatment at their clinics without having to send the patient to a different clinic. Furthermore, all respondents agreed that the platform is a faster way of conducting specialist consultations. One dental practitioner emphasized: *“Certainly, it is possible that we contribute to an increased quality of dental care in our immediate area as we have these opportunities and not all clinics even have a CBCT scan”* (Respondent D).

5.3.2 The Platform Owner as a New Part of the Value Network

The respondents highlighted that the transformation of the specialty consultation practice also alters the original value network. Instead of the network consisting of only dental practitioners and specialists, the platform owner now constitutes as a new stakeholder. The respondents stated that this changes the process of connecting with each other and how their collaboration is contracted. The platform now functions not only as the communication technology, but also removes the need for contracts and invoicing between individual dental clinics and specialists. One specialist explained that their office now gets its payment minus commission from the platform owner. The dental practitioners indicated that the platform owner removes the need to search for specialists to collaborate with, since they now get connected through the platform and make the payment to the platform owner. One respondent clarified: *“Earlier we had to find a specialist on our own who was available here in the immediate area and sign a contract with that person”* (Respondent B).

5.4 Organizational Barriers and Structural Changes

The interviews showed that the value creation is occasionally affected by *organizational barriers* such as resistance when it comes to practitioners actively and consistently using the platform in their daily practice. Some dental practitioners indicated that resistance arises when it comes to ending the relationship between the dental practitioners and their former specialists, as they are often closely related. One

respondent explained: *“I have an old friend who is a radiologist that I sometimes still send some images to. I have not been able to just end that collaboration yet. It's not that often and eventually I'll just use Boneprox”*(Respondent G). The importance of the relationship is also confirmed by the platform owners, who indicate that one of the greatest obstacles to selling their service to dental practitioners is that it requires practitioners to end the relationships with their current radiologists.

Within the context of *structural changes* that can affect the value creation, the respondents stated that a sufficient organizational structure is already in place when implementing the platform. Five of the dental practitioners work in clinics ranging from a size between three and four employees, two respondents reported six to eight staff members in their clinics, and one respondent works in a clinic with more than 18 employees. The respondents explained that, due to their relatively small sizes, there are flat hierarchies in place. Additionally, to use the digital platform in their daily practice, almost all respondents stated that they do not need any additional skill. They felt immediately comfortable with this digital solution. Both dental practitioners and specialists are able to operate in the platform after an initial explanation of five-ten minutes, reporting it to be “simple” and “easy” to use.

5.5 Positive and Negative Impacts

There seems to be consensus among the respondents that mainly *positive impacts* are generated through the use of the platform technology. For all respondents, the main advantage lies in the improved transmission of data. In general, the platform is also seen as a secure and GDPR-compliant solution for both specialists and dental practitioners, something which their previous practice was not:

“Boneprox has created a way for me to carry out consultations safely, legally so to speak. With GDPR being implemented, I am no longer able to conduct the consultations the way I used to do.” (Respondent J)

However, one interviewee expressed the following concern:

“One challenge for me is security. Is the information encrypted? Where does that information go? What are the logics behind security? It's such a big question that I hardly dare to think about whether someone would infringe and access the information.” (Respondent E)

For clarity and differentiation, the following section is divided into how dental practitioners and specialists experience the generated impacts.

5.5.1 Impacts for Dental Practitioners

The respondents highlighted that they can now offer a better service to their patients because they can give them a faster diagnosis, thereby enabling the patients to receive treatment earlier. In addition, the platform technology enables them to show patients what they are doing and provide patients with more information. According to the respondents, this is assumed to enhance their credibility. Through the platform structure and with the increased speed of communication, they can also accept more patients now and have more control over their consultations:

“[In the past, the mail] was often lying around for several days and you forgot about it but now it goes out immediately. Then, you have all the answers from radiologists saved in the [platform], so you have access to all consultations all the time. It is much faster, safer and more efficient for us now because we have better control.” (Respondent C)

By using the platform technology, some respondents also noticed a competitive advantage over others, as they can now offer CBCT scans and guarantee faster evaluation. Furthermore, some dental practitioners mentioned that it is a more cost-saving method, whereas for others it is roughly equivalent to the previous one since they are not entitled to receive a commission for this type of consultations: *“If you send a referral to a patient who goes to the specialist, then the patient must pay the specialist. With Boneprox we have to pay to the specialist ourselves”* (Respondent B). In addition, to the changes in financial performance, the platform changes the working behavior, as the respondents highlighted that it is more enjoyable and fun to work with the platform, especially since they get direct answers. Moreover, two respondents revealed that they use the examination of the specialist as an educational training activity, which they haven't been able to do before:

“We have better teaching of what we send you can say. You have photos and statements and we go through it in the team since then we have an education with the help of that information. It's not like looking at a textbook anymore, but you get the case and have to think for yourself and have the photos and the statements.” (Respondent B)

However, a few respondents also explained that the platform does not offer any possibilities to communicate with the specialists via the platform itself. They occasionally have to contact them by telephone or email just as they did before using the platform if they have questions about the examination or want to further discuss the topic. Furthermore, for one respondent, it is questionable to copy and paste the specialist statement from the platform to the journal system due to the security aspect when selecting the parts to be copied, since certain parts of the statement could be omitted.

5.5.2 Impacts for Specialists

One major positive impact of the platform that the specialists described is that it allows them to place a greater focus on analyzing the images right away. In the past, they had to busy themselves with more administrative tasks, such as contracting with dental practitioners or invoicing. Now, the platform owner facilitates and administers the collaboration between specialists and the dental practitioners who send the consultation requests.

Furthermore, the specialists stated that they have a broader customer base now, since they are automatically the responsible specialist as soon as a dental practitioner joins the platform. One platform owner explained that the specialist community comprises approximately 10 maxillofacial radiologists in Norway and 14 in Sweden. Within the last few years, the platform gained 15% of the Norwegian market and 6% of the Swedish, lowering the market share for other specialists. The specialists interviewed perceived their work through the platform as a new competitive advantage. The respondents highlighted that the perception of specialists that still conduct the consultations in the traditional way is slowly changing and puts them under pressure to consider joining the platform. Furthermore, the platform owners see that their customer base is continuously growing and that the more clinics the platform has, the easier it becomes for them to sell it as they receive an increasing number of valuable recommendations. One respondent also highlighted that the growing customer base makes their work more interesting and that all their clients are connected through one system rather than across several different ones: *“This is like the dream that I had when I started working”* (Respondent I). In addition, specialists get to answer more consultations, which leads to a higher revenue stream, since they are paid per consultation even though they have to pay a commission to the platform owner now:

“I have about 10 consultations per day now. So, it’s about 150-200 per month. Before on my private note I only had up to 10 per month because of the flow with the mail system. That was really old school.” (Respondent I)

However, as in the traditional consultation process, the platform did not change the fact that additional communication with the dental practitioners is often needed, for example, about technical problems or further explanations. The respondents stated that the platform does not offer these communication channels. Therefore, the respondents said that they also use alternative communication channels such as telephone or email. One respondent highlighted the importance of the collaboration and that this did not change by using the platform:

“For me it is more when there is a new customer I want to follow up and see if they can start using the [platform] or if there are any problems. I send them

a welcome email and I just want them to contact me and also start the communication. That is really important for me that I have my own personal communication.” (Respondent I)

6 Discussion

Overall, the findings of our study offer insights into how platform technology is transforming dental specialty consultation. Below, we explain these findings through the filter of relevant literature and reflect on the usefulness of our chosen theoretical framework.

To begin with, our findings show that the GDPR law constitutes a *disruption* of old procedures and thus triggers a *strategic response* from dental practitioners. In line with previous research (Bharadwaj et al., 2013; Matt et al., 2015), it becomes evident that the primary motivation of implementing the platform technology for the dental practitioners is to adjust the specialty consultation practices to the new requirements, which can be interpreted as strategic response as the platform helped the dental practitioners to rapidly adapt to these conditions (Vial, 2019). But this insight also raises the lingering question of what methods are being used by dental practitioners and specialists outside of the BPX platform to conduct specialty consultations GDPR-compliantly.

Our findings reinforce the importance of technology adoption before making active *use of digital technologies* and indicate that the platform technology showed no major obstacles in the adoption for dental practitioners and specialists. As concluded by van der Zande et al. (2013), usability, mindset, skills, and frequency of treatment performance are common barriers to adopting digital technologies. In contrast, and somewhat surprisingly, our study shows that the implementation of the platform is only to a limited extent affected by such barriers. As most respondents carry out specialty consultations daily, our findings indicate that a high frequency of treatment performance makes practitioners more likely to change (cf. van der Zande et al., 2013). In addition, our study shows that the change to actively make use of the platform occurs through training and communication by the platform owner. Thereby, the platform owner acts as a change agent and stimulates the change progression and process for both specialists and dental practitioners. This finding supports previous research (Armenakis & Harris, 2001; Vos & Rupert, 2017).

Based on the common *use of digital technologies*, our study clearly shows that the platform enables major *changes in the value creation path*. In fact, the most striking finding is that the platform owner functions as a digital matchmaker between dental practitioners and specialists. This new role is not covered in Vial's (2019) framework and thus presents an important contribution to research in this area. Even though the workflow for the dental practitioners and specialists has not itself changed, operating through a platform leads to a new actor in the value network: the platform owner. Thus, our findings are consistent with what has been found previously by Skog

(2019), for example, that the platform owner is a very influential actor, if not *the* most influential actor, in this network.

Our findings demonstrate that the qualities of the platform owner reflect that of a digital matchmaker. In comparison to the principles of digital matchmaking and their accompanying elements discussed by Ivarsson and Svahn (2020), our study shows the principles of governing transactions and relationship building to a greater extent. Intriguingly, there is not sufficient evidence for curating matches. This does seem to depend on the specialist's side of the platform as that is not open for competition yet. However, in alignment with the ideas of Ivarsson and Svahn (2020), our study exemplifies that the platform owner facilitates an orchestration between the dental practitioners and specialists whereby the consultation process is an autonomous transaction between them. Moreover, the platform owner enables a smooth entry and participation for both actors (Van Alstyne et al., 2016) and reduces the risk of a "faceless" interaction as revealed by Parker and Van Alstyne (2012) by letting the specialists introduce themselves to the dental practitioners. In addition to these elements of matchmaking, our study underlines that the main value is now created from the interconnected relationship between the actors of the platform ecosystem, which is in line with the results of McIntyre and Srinivasan (2017). This finding strongly suggests that future dental practitioners and specialists who join the platform can expect that there will be an additional key player in the specialty consultation network. This creates a need for future dental practitioners and specialists to establish a new relationship with the platform owner as the new player in the ecosystem.

Even though *changes in the value creation path* typically require *structural changes* and are affected by *organizational barriers*, our study surprisingly shows only limited occurrences of these two aspects. As most of the dental practitioners in our study work in clinics that only consist of three to four employees, our findings indicate that smaller organizations as such are not impacted structurally when implementing the platform technology. Similar to the findings of Svahn et al. (2017), our study suggests that the platform owner lowers resistance by, for example, carrying out workshops and showing the actors how to operate the platform and the advantages of using it.

In addition to the effects on value creation path, our study demonstrates that the use of platform technology generates *positive and negative impacts* for both the dental practitioners and specialists. Our findings show that there were mainly positive impacts in operational efficiency and organizational performance, now that dental practitioners and specialists can carry out the consultations digitally (Hess et al., 2016). Dental practitioners and specialists both stated that conducting consultations digitally is a much quicker workflow process than the previous work practice. As a result, both actor groups have more time to administer and assess a larger number of patients. This provides an insight into the positive implications of conducting specialty

consultations through a digital platform for future dental practitioners and specialists that join the platform. Further, it implies that the use of the platform might lead to positive outcomes at the societal level. Since the patients can receive faster treatment and the dental practitioners can administer more patients in general, there might be an increase in quality of life for individual patients, which is in accordance with previous research from Agarwal et al. (2010). In line with previous research (Eisenmann et al., 2006; Hagi, 2014), our study also provides insights into the cross-side network effects of the platform for specialists, whose work is made more interesting and rewarding as they engage with an increasing number of dental practitioners on the other side. Furthermore, the specialists appear to have an increased financial performance due to a bigger and still growing customer base, which is similar to the findings of Vial (2019).

Our study shows that the implementation of the platform is an incremental step in their overall DT process and that in general DT is progressing slowly (Herrmann et al., 2018) as only larger clinics have a digitalization strategy in place. The absence of digitalization strategy appears to correspond to a lack of resources, as most of the interviewed dental practitioners work in smaller clinics which are likely unable to make large investments (Hess et al., 2016). In addition, our study partly aligns with Kane's research (2015) in that the dental practitioners have insufficient knowledge about digital technologies. Based on our study, the dental practitioners are mainly implementing technologies such as the BPX platform, intraoral scanners, or 3D printers, that are only changing the analysis and treatment practices within the clinics, but not focusing on the transformation of the clinics towards a patient-driven approach as similarly outlined by Shetty et al. (2018). This provides the insight that the platform technology can be seen as an important step in the overall clinical transformation and thus as a milestone in the DT process for the dental practitioners.

In the future, the platform can play a powerful role as it allows for different services and products to grow together and enable digital innovations between the dental practitioners and specialists (de Reuver et al., 2018; Kaye, 2018). This can be supported by the platform owner and its role as digital matchmaker, for example, by mobilizing innovation when cross-industry collaborations are established (Ivarsson & Svahn, 2020). The platform paves the way for a seamless information transfer, for example, from the CBCT scanner to the platform and back to the journal systems, which, in turn, facilitates an even faster and easier data transmission resulting in quicker patient response and, ultimately, treatment.

To summarize, our study shows that the platform technology allows dental practitioners and specialists to conduct specialty consultations digitally. However, the workflow itself has not changed and has not required any major alterations of the culture, mindset, or behavior amongst the practitioners or specialists. In line with Anderson and Anderson (2002), this implies that the use of the platform technology

may be a transitional change rather than a developmental or transformational change. The transition to the digital workflow appears to have been primarily made to fix the problem of how to GDPR-compliantly conduct specialty consultations by focusing the change on the implementation of the new platform technology.

Finally, we consider the building blocks of Vial's (2019) framework for understanding digital transformation as useful for the guidance and evaluation of the DT process. The themes covered by the building blocks provide a holistic overview and show the interconnectedness between the blocks. In line with Vial's starting block, the *use of digital technologies*, our study indicates that the amount of data generated by digital technologies initially fueled the establishment of the GDPR law, which can be seen as disruption. However, regulations are not typically covered by the block *disruptions*. Therefore, we suggest adding another building block that covers contextual changes which are forcing organizations to form strategic responses there too. In addition, we see that within the building block *use of digital technologies*, the adoption of technologies should be included as well. In our study, the platform technology adoption directly has an influence on *changes in the value creation path*.

7 Limitations and Suggestions for Further Research

Because this is a single case study, there are a number of limitations regarding its generalizability that need to be highlighted. First, the selection of the dental practitioners only represents clinics that are currently using the digital platform. In addition, some of the respondents only implemented the platform a few months ago, which may affect the study's robustness in terms of to what extent the study can be generalized across contexts.

Second, we were not able to conduct observations at either the dental practitioners' or specialists' places of work given the geographical distances between the practices in our study. Hence, further research could be conducted applying an extended approach and with a bigger user base.

Third, the scope of our study is limited to the oral healthcare industry in Sweden and Norway. As we conducted our study within this specific sector and context, relevance outside this sector, especially in light of the differing health care standards and practices across and within other countries, cannot necessarily be assumed. With this backdrop, future research could focus on the use of platform technology as part of a transformation process in other industries, both within the healthcare sector, and outside of it, such as in retail, life sciences, and education. In other health care sectors in particular, it might be meaningful to investigate how specialty consultations are conducted. Longitudinal studies are needed to provide more solid results in terms of implications to both our study's theory and practice.

Fourth, while Vial's (2019) conceptual framework is useful, it is relatively new and has not thus far been sufficiently explored in practice vis-à-vis its applicability to the DT process. We identified, for instance, that the framework is lacking in its scope to include contextual changes and technology adoption. This calls for further research in the application of the framework generally, and, specifically, in concert with digital platform technology.

8 Conclusion

The objective of our study is to explore the implications of implementing platform technology within dentistry. Based on this explorative piece of research we draw the following conclusions:

First, the platform technology has digitalized the workflow of dental specialty consultations for dental practitioners and specialists in both Sweden and Norway, but the workflow itself has remained the same. The platform technology has thus resulted in a transitional change for dental practitioners and specialists, meaning the workflow is altered to have a GDPR-compliant solution. Second, the platform technology has changed the value creation path in that the network is now orchestrated by the platform owner who functions as matchmaker between the dental practitioners and specialists. Third, the platform technology has resulted in positive impacts for dental practitioners and specialists in terms of an increased operational efficiency with time savings, an enhanced competitive advantage, and better overall patient care and safety.

The dental practitioners and specialists consider the implementation of the digital platform as an important part of the general digital transformation within dentistry as this type of digital technology is still rarely used within the industry. Through being a part of the platform ecosystem, the dental practitioners can take part in creating a more digitalized future and, in doing so, acquire the flexibility to adapt to changing environments and adopt new technology.

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10 Appendix

Appendix 1 – Interview Guides

Dental Practitioners

1. *General*

- Please briefly describe the size your clinic and explain what role you have!

2. *Use of the Platform Technology*

- Since when do you use Boneprox?
- Why did you decided to use Boneprox? What were the motivations/important criteria that you considered?
- How often do you use the platform now and what are your current operations?
- Which functions / activities do you currently miss when using the platform technology?
- What were your expectations on Boneprox as platform owner?
- How has the use of the platform technology helped you to adapt to technological changes in dentistry?

3. *Changes in the Value Creation Process*

- Could you describe how the typical specialty consultation process looked like (before using the platform)?
- How does a typical practice (workflow) looks like now?
 - What is digital in that workflow?
 - What do you have to do manually?
- How is there is a new value proposition for your customers now that you use the platform?
- How did the use of the platform changed the way you work with specialists?
- From your point of view, how do you see the expectations that the specialists have towards you?

4. *Structural Changes*

- Have there been any structural changes during your transformation process and to use the platform?
- What did you needed on new/additional infrastructure to use the platform technology?
- Which additional skills did you needed for using the platform technology?
- From your perspective, how has your role changed now that you are using the platform? What responsibility do you have now? Is it different?

5. *Organizational Barriers*

- Do you think there is are any barriers (inertia or resistance) when it comes to using the platform? Why?

6. *Positive and Negative Impacts*

- How did the platform technology affected your operational efficiency and organizational performance?
- Do you have an increased capacity for specialty consultations? What effects does this have on your costs?
- What are your concerns when working with the platform technology?
- What are the benefits and challenges when working with the platform technology?

7. *Disruptions*

- What disruptions have occurred in the dental industry?
- How have your expectations regarding digital technologies changed when using the platform?
- How do you use the data that is generated by the platform technology?

8. *Strategic Responses*

- Why would you say dentistry is currently undergoing a digital transformation?
- Do you have a digital transformation strategy? How does it look like?
- What other digital technologies (solutions) are you using? How are you using them?
- How has the use of Boneprox awakened a desire to digitize other aspects / services of your tasks as well? Which ones?

Specialists

1. *General*

- Please briefly describe the size your clinic and explain what role you have!

2. *Use of the Platform Technology*

- Since when do you use Boneprox?
- Why did you decided to use Boneprox? What were the motivations/important criteria that you considered?
- How often do you use the platform now and what are your current operations?
- Which functions / activities do you currently miss when using the platform technology?
- What were your expectations on Boneprox as platform owner?
- How has the use of the platform technology helped you to adapt to technological changes in dentistry?

3. *Changes in the Value Creation Process*

- Could you describe how the typical specialty consultation process looked like (before using the platform)?
- How does a typical practice (workflow) looks like now?
 - What is digital in that workflow?
 - What do you have to do manually?
- How is there is a new value proposition for your customers now that you use the platform?
- How did the use of the platform changed the way you work with dental practitioners?

- From your point of view, how do you see the expectations that the dental practitioners have towards you?
4. ***Structural Changes***
 - Have there been any structural changes during your transformation process and to use the platform?
 - What did you needed on new/additional infrastructure to use the platform technology?
 - Which additional skills did you needed for using the platform technology?
 - From your perspective, how has your role changed now that you are using the platform? What responsibility do you have now? Is it different?
 5. ***Organizational Barriers***
 - Do you think there is are any barriers (inertia or resistance) when it comes to using the platform? Why?
 6. ***Positive and Negative Impacts***
 - How did the platform technology affected your operational efficiency and organizational performance?
 - Do you have an increased capacity for specialty consultations? What effects does this have on your costs?
 - What are your concerns when working with the platform technology?
 - What are the benefits and challenges when working with the platform technology?
 7. ***Disruptions***
 - What disruptions have occurred in the dental industry?
 - How have your expectations regarding digital technologies changed when using the platform?
 - How do you use the data that is generated by the platform technology?
 8. ***Strategic Responses***
 - Why would you say dentistry is currently undergoing a digital transformation?
 - Do you have a digital transformation strategy? How does it look like?
 - What other digital technologies (solutions) are you using? How are you using them?
 - How has the use of Boneprox awakened a desire to digitize other aspects / services of your tasks as well? Which ones?

Platform Owner

1. ***General***
 - What is the history and founding story of Boneprox?
 - How did you come up with the idea to open up Boneprox as a platform?
 - Can you describe your roles and the structure of the company?
 - How would you explain the main goal/purpose of your company?
2. ***Platform***
 - How would you describe/classify your platform?
 - What are the challenges your company is facing in being platform owner?

- What is a daily challenge that you have?
- How often do you evaluate the usefulness and problems of the platform?
- What is the most common feedback you hear from dentists/ specialist?

3. *Platform Ecosystem*

- How would you describe the Boneprox ecosystem?
- How do you acquire new customers? How do you promote your platform?
- What do you think is your main selling point?
- What do you think is the main motivation for dentists / specialists to use your platform?

4. *Value Creation*

- How would you describe the value of the platform technology for the dental practitioners?
- How would you describe the value of the platform technology for specialists?
- What new value do you think was created by your platform?
- How has the collaboration between involved actors functioned? Has any actor struggled to deliver in their role? Has there been any conflicts?

5. *Structural Changes*

- What capabilities are required by the dentists and specialists to perform their activities (role)?

6. *Organizational Barriers*

- Which kind of resistance do you think exist (might exist) for your platform? Please specify for clinics and specialists.

7. *Positive and Negative Impacts*

- What do you think are the challenges which the dental practitioners / specialists face?
- What do you think are the benefits the dental practitioners / specialists gain?

8. *Digital Transformation in Dentistry*

- Is dentistry digitally transforming?
 - In what way? Besides your own platform?
- How would you explain your role within the industry of dentistry?
- Do you think your platform is part of the DT in clinics? Why?
- What parts of dentistry can still be digitally transformed?
- What disruptions have occurred in the dental industry?

9. *Future*

- What are your biggest challenge for the future?
- What strategy do you have for the future?
- Are there plans to “open up” the specialist-side? How and why?
- What features do you plan to add in the future?