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DIGITAL PLATFORM DEVELOPMENT: A SERVICE-ORIENTED PERSPECTIVE

Complete Research

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Abstract

The traditional view of value is largely rooted in the material properties of physical goods. However, service-dominant logic tells us that value is not imbued in goods, but derived in its judicious application. A contextually bounded nature of value is highly relevant for the study of digital platforms given the reprogrammable nature of digital technology coupled with a necessity to serve several different stakeholders and applications. This paper applies servitization as a theoretical framework for illustrating the subjective and transitory value propositions that influence platform development. Based on a case study of a firm that has transitioned from product supplier to provider of a platform for digital services, it is evident that value propositions are ambivalent, yet vital components in the evolution of platforms. Furthermore, we may discern that platform providers are faced with value propositions that are multidirectional, multidimensional, and offered from a variety of sources.

Keywords: *Digital platforms, digital services, servitization, service-dominant logic, case study.*

1 Introduction

The need to balance efficient production with increased customer responsiveness has brought about the rise of platforms in many industries. Although the nature of platforms vary depending on their application (Gawer, 2014), a common feature is their ability to permit repeatable solutions and facilitate contact between different actors. Recent years have witnesses the rapid emergence of digital technologies as not just an enabler, but indeed a material basis for platform development. Digital technology is highly flexible as it permits the disaggregation of a platform's constituent parts into physical modules that may be standardised and digital modules that can be modified, copied, and disseminated at very low cost (Yoo, Henfridsson & Lyytinen, 2010). The runaway success of Apple's iPhone (Ghazawneh & Henfridsson, 2013) is a clear testament to the appeal of digital platforms and their ability to attract complements.

Although digital platforms offer great potential, they are by no means a panacea for value creation. Recent research (Nambisan, 2013; Lusch & Nambisan, 2015) highlights the fact that our understanding of digital technologies is still largely related to its applicability as a raw material for building computers and other devices. In other words, our notion of its value and applicability is more likely to inundate the platform provider with technical possibilities rather than guide decisions suitable to a particular set of circumstances. Furthermore, issues like platform development (Tiwana, Konsynski & Bush, 2010), governance (Eisenmann, Parker & van Alstyne, 2009), and diffusion (Tilson, Sørensen & Lyytinen, 2013) are perennial and by no means resolved by simply applying newer technologies. Platform providers are still in a very real sense wedged in-between two (or more) types of stakeholders (Evans, 2009; Ceccagnoli, Forman, Huang & Wu, 2012) whose subjective needs and perspectives must be reconciled (Pekkarinen & Ulkuniemi, 2008; Rahikka, Ulkuniemi & Pekkarinen, 2011). With this in mind, I therefore pose the following question: *How may appreciation of the contextual nature of value affect the development of digital platforms?*

In an attempt to answer the research question, I apply *servitization* (Oliva & Kallenberg, 2003; Baines, Lightfoot, Peppard, Johnson, Tiwari, Shehab & Swink, 2009) as a theoretical framework to explore the operant potential of information technology for platform design. By complementing back-end capabilities for repetition inherent in IT with front-end capabilities for customisation (Chesbrough, 2011), firms may position themselves so that they can leverage their professional expertise against the idiosyncrasies of each customer. The distinction between back-end vis-à-vis front-end capabilities highlights the subjective nature of value, and suggests that platform developments are driven by *value propositions* (Ballantyne, Frow, Varey & Payne, 2011; Lusch & Vargo, 2014) that may be prompted by individual actors, business contexts, or technical advances. I illustrate my reasoning using a case study of DigitalCo, a firm that over the course of 13 years has evolved from a barely profitable provider of digital products for wireless communication into a successful platform provider that with the aid of different partners offers digital services across several industries.

The paper opens with an overview of platforms with emphasis on the properties of digital platforms. Following that, I present a theoretical framework based on servitization that is suitably adapted to address the role of digital technology. I then outline the methodological approach and the case study before presenting the results. The paper concludes with a discussion that relates empirical findings to extant literature and suggestions for future endeavours.

2 Digital platforms

In recent years, the platform concept has proliferated and is subject to different interpretations across different areas of application (Cusumano, 2012). Although heterogeneous, platform literature may be broadly dichotomised into two research streams: platforms as marketplaces or platforms as technical architectures (Gawer & Cusumano, 2013; Gawer, 2014; Thomas, Autio & Gann, 2014). From a business perspective, platforms form a hub for two-sided (or multi-sided) markets that facilitate exchange between actors. Their raison d'être is essentially to connect actors, coordinate exchange, and enable strategies that would otherwise be impractical. This stream of research is largely focused on issues like network effects, platform governance, and competition between platforms (Boudreau & Haigu, 2009; Eisenmann, Parker & van Alstyne, 2011; Ghazawneh & Henfridsson, 2013). The second stream of research centres on the makeup of the platform itself by distinguishing between a stable core and replaceable modules or complements. The resulting structure can be leveraged for mass-customisation within a value chain or in a wider ecosystem (Gawer, 2009; Baldwin & Woodard, 2009). The latter is especially common in the IT-industry where short life-cycles force specialisation and product architectures must be able to accommodate a high degree of modularity (Wareham, Fox & Cano Giner, 2014).

While either type of platform may be implemented with the aid of IT, digital technology offers possibilities that extend beyond the characteristics addressed in extant platform literature. The distinguishing feature of digital platforms is a layered modular architecture (Yoo et al, 2010; Yoo, Boland, Lyytinen & Majchrzak, 2012) that consists of four layers: device, network, service, and contents. Each layer is entirely interchangeable and not limited to any one actor or proprietary technology. A common example of a layered modular architecture is the hierarchy of technologies needed for mobile telephones (Yoo, Lyytinen & Yang, 2005; Basole, 2009). The telephone (device) is connected to a carrier (network) which enables the user to place calls or access the Internet (service) where he/she can access websites or download music (content). Loose couplings between layers enable users to replace any layer with a similar module without discarding the remaining architecture, e.g. switch carriers without discarding the telephone, content, and ability to access services.

Enabled by a layered modular architecture, digital platforms offer us unprecedented flexibility to connect different resources and actors. However, their implementation and use is still bounded by some of the static ideas that are present in platform literature (Gawer, 2014). First, market platforms are based on the assumption that suppliers and consumers are fixed roles of actors that are always present and willing to interact, but are unable to do so unless aided by an amenable structure for exchange. However, the difficulty in establishing new platforms demonstrates that it takes more than mere opportunity to

attract adopters (Evans, 2009). Second, literature on technical platforms assumes that innovation and variation only occurs on peripheral modules. The core of the platform is taken to be stable and not subject to development or evolution. It is questionable whether the simple core-module dichotomy holds for digital platforms as physical- and digital materiality coupled with a high level of modularity creates a structure that is emergent rather than known a priori (Yoo et al, 2012; Kallinikos, Aaltonen & Marton, 2013).

A common view often expressed in business literature (e.g. Teece, 2007; McGrath, 2010; Zott, Amit & Massa, 2011) is that the value of a technology or innovation is derived from the ability to serve as a basis for a commercial offering. Lusch & Nambisan (2015) further elaborates upon the subjective notion of value, stating that "…value occurs when the offering is useful to the customer or beneficiary (value-in-use), and this is always in a particular context" (p. 159). Applied to platforms, one can argue that the static ideas present in extant research leaves platform providers ill-equipped to deal with a notion of value that is not absolute, but subjective as well as transient. We have an opportunity to better understand platform development if we appraise value not as imbued in technology, but as something that is sub-jectively determined by the platform provider in light of maintaining viability despite changing circum-stances.

3 Servitization

Servitization represents the development of a business model based on existing latent properties within a product or technology (McGrath, 2010; Lehoux, Daudelin, Williams-Jones, Denis & Longo, 2014). Customer preferences play a large part determining not only which latent properties are developed, but also what form they take in a finished commercial offering – product, service, or combination thereof.

The conceptualisation of services as add-on to products is largely a remnant of goods-dominant logic (Vargo & Lusch, 2004; 2008) where the retail of merchandise is the core of market activities A transition from goods-dominant logic to service-dominant logic has several corollaries, one of the more significant being that value is not something that is created in product exchange, but in product *use*. Unlike goods-dominant logic where the merit of commercial offerings is determined based on value-in-exchange, service-dominant logic entails a highly contingent and phenomenological view on value that is as much determined by context as the makeup of the good or service (Lusch & Vargo, 2014). Furthermore, as customer use is an inherent part of value creation, the supplier cannot unilaterally determine the value of a commercial offering. In other words, the producer does not produce value per se, but offers *value propositions* that may be embraced or rejected.

Value propositions describe ways and means by which an actor proposes to positively affect another actor (Lusch & Vargo, 2014). The contextual nature of utility makes the notion of value highly subjec-tive and likely to change over time (Chandler & Vargo, 2011). Moreover, the service provider faces a precarious position as value propositions should ideally be generic enough to suit many customers, yet specific enough to address each customer's situation (Rintamäki, Kuusonen & Mitronen, 2007). In order to respond to these seemingly incongruous demands, organisations tend to bifurcate into a front-end that is highly flexible and responsive to specific customer needs, and a back-end that is considerably more homogeneous and focused on development and operational efficiency (Galbraith, 2002; Chesbrough, 2011; Grönroos, 2011). Den Hertog (2000) offers a conception of how different domains of service innovation can be expedited through the affordances offered by information technology. He describes that the IT proximate back-end as formed from technology options and delivery system, whereas the front-end encountered by customers may be described in terms of client interface and service concept.
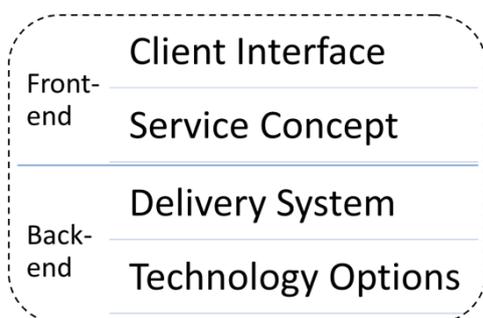
Figure 1.   Layers of IT-enabled service platform. Adapted from den Hertog (2000).

3.1   Back-end

The back-end of IT-enabled service provision essentially forms the infrastructure needed to form, support, and deliver services. It is built upon standardised internal processes that enable economies of scale through effective management of resources (Davies & Brady, 2000; Storbacka, 2011) whilst minimising cost (Chesbrough, 2011) and utilising the provider's dynamic capabilities (Teece, 2007). As the back-end is an internal matter that is effectively invisible to outside parties, it draws upon a relatively homogeneous base of skills and knowledge that is not subject to the changing environments of different customers (Davies & Brady, 2000). We may distinguish between two layers of the IT domain: technology options and service delivery system. The technology options entail the basic architecture that enables the performance of services. In the case of digital platforms, technology options describe the different ways to design a digital device that permits information to be created and processed. While the digital device in itself does not need to be innovative in any way, it must be designed in a manner that is commensurate with its task (Woodard, Ramasubbu, Tschang & Sambamurthy, 2013). In order to serve as an interface for service provision, a digital device must be complemented with a delivery system that links customer and provider. The ability to integrate the digital device in the user context, and then relay information to the service provider highlights the ostensible simplicity in exploiting a digital device vis-à-vis the skills needed to design them (Day, 1994; Windahl & Lakemond, 2006).

3.2   Front-end

As services may well be introduced in environments and industries that are diverse as well as subject to rapid change, the front-end is intended to be highly responsive to the requirements and preferences of the customer. It is therefore necessary to engage in activities that enable the organisation to sense market trends, solicit feedback from customers, and combine skill-sets to improve existing services (Miller, Hope, Eisenstat, Foote & Galbraith, 2002) as well as design new offerings (Day, 1994; Meyer & Detore, 2001; Zahra & George, 2002). The idea is to exploit the economies of repetition derived from back-end capabilities coupled with market knowledge in order to derive economies of scope. Again, we may delineate the front-end of service provision in two layers: service concept and client interface. The service concept essentially describes the nature and function of a service. A service concept may be a single service that originates with one or multiple parties (Ballantyne et al, 2011; Vargo & Lusch, 2011), or aggregated bundles of services (Tuli, Kohli & Bharadwaj, 2007; Storbacka, 2011). The client interface represents the manner in which the service is designed to highlight its value vis-à-vis the specific needs of an individual customer (Cantù, Corsaro & Snehota, 2012; Jaakkola & Hakanen, 2013). It may entail transposing an existing service into an entirely new context (Tuli et al, 2007), a phenomenon sometimes referred to as position innovation (Francis & Bessant, 2005).

4   Method

The purpose of the study at hand is to address the development of digital platforms and highlight the contextual nature of value in such an endeavour. I have pursued this topic using a single case study

(Eisenhardt, 1989; Yin, 2011) that describes the evolutionary trajectory of a firm, DigitalCo, that has evolved from product supplier to platform provider. The study may be described as an explorative study intended to develop theory regarding a particular phenomenon – a goal which is in keeping with case studies' potential for generalizability (Lee & Baskerville, 2003).

The study employs a qualitative approach which is motivated by the partly retrospective nature of data and the initial unfamiliarity of the researcher with the business area as well as focal enterprise. As is common in case studies (Yin, 2011), data was collected through several means, including meetings, presentations and semi-structured interviews. Six interviews were conducted with informants at DigitalCo, including the chief executive officer (two interviews), chief operations officer, business area manager, area sales manager, and research & development manager. Distributing interviews over several distinct professional roles as well as organisational positions not only serves to provide a rich understanding of the case, but also to minimise any bias held by informants (Eisenhardt & Graebner, 2007). Limiting interviews to employees at one firm is motivated by the scope of the study which is limited to the role and perspective of the platform provider vis-à-vis external forces and interests. The retrospective nature of the study, coupled with initial unfamiliarity of the business domain, suggested that interviews would be a suitable primary source for data as they promote informed answers and access to the expertise of informants, enabling "in-depth studies […] in plain and everyday terms" (Yin, 2011, p. 6). All interviews were semi-structured (Creswell, 2007) and conducted in informant workplaces and lasted between 45 and 70 minutes. A semi-structured approach mitigates the inherent dichotomy of interviews, i.e. the interviewer guides the conversation even though the interviewee possesses the sought information (Kvale & Brinkmann, 2009). Openness to new avenues, sometimes referred to as *deliberate naiveté*, allowed the interviewer to influence the direction of the interview via follow-up questions or requests for clarification. All interviews were recorded and subsequently transcribed.

In addition to interviews, the researcher was further sensitised to the circumstances surrounding the case via documentation pertaining to the platform as well as attendance in meetings and workshops with representatives from the firm. Fieldwork was conducted using iterative sampling (Miles, Huberman & Saldaña, 2014) whereby each activity serves to collect material as well as inform subsequent data gathering as the researcher gains deeper understanding of the case and its context.

The analysis of the empirical material was conducted via a qualitative research process (Eisenhardt, 1989; Miles et al, 2014) whereby the author collects and interprets data (Walsham, 2006) based on a specific topic of interest or area of concern. As data was not gathered with little initial insight into the object of the case study, coding and analysis followed a more deductive approach than the initial collection of empirical material. The theoretically derived layers of an IT-enabled service platform were used as basis for coding whereby properties associated with different layers informed the development of codes, and the layers themselves served as sub-codes to categorise data as well as determine their relevance to the study at hand. A subsequent second-cycle coding process grouped data into more abstract categories, e.g. in order to couple events and decisions with motives and outcomes. As the number of interviews conducted is relatively small, a generic word-processor provided sufficient functionality to code and analyse the empirical material.

5 Case study

DigitalCo, a firm founded in 2000, is located in northern Europe that as of early 2015 houses approximately 30 employees. The company has developed a platform for machine-to-machine (M2M) communication, DigitalCoMobile, and cultivated a small but growing ecosystem of external service suppliers. At its most basic level, DigitalCoMobile may be described as a platform for secure, mobile communication that links a user system to back-office system(s). The mobile device may be integrated into user systems using common interfaces like Ethernet and Universal Serial Bus (USB), as well as the more specialised Controller Area Network (CAN) bus which is common in automotive applications. The mobile device can accommodate a number of protocols for wired- and wireless communication as well as localisation using the Global Positioning System.
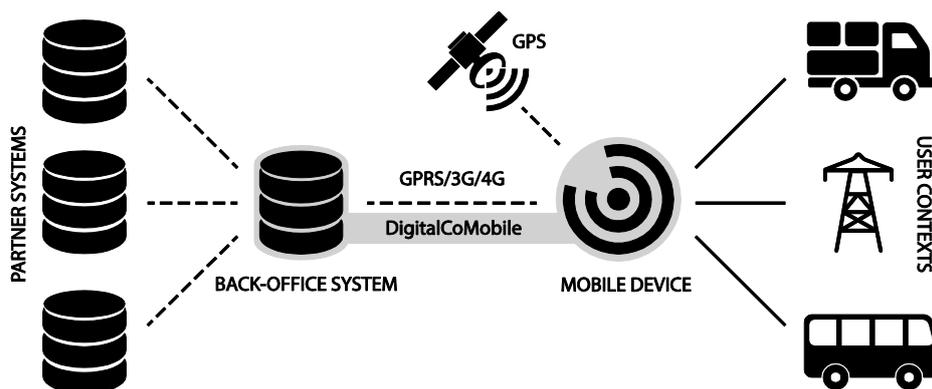
Figure 2.   Outline of case study.

The platform is comprised of a thin client (a specialised router) that provides a secure link between user context (e.g. a vehicle) and corresponding back-office system where the bulk of information processing takes place. The back-office system may in turn forward data to other destinations (i.e. partners) depending on the nature and origin of different services.

Communication with back-office system(s) is in most cases accommodated through wireless data transfer via the same infrastructure that is used for mobile telephony. Users can use this secure link to either gather data from – or transmit instructions to – localised systems. As customers typically rely on DigitalCoMobile to continuously transmit data even under extreme conditions, high demands are placed upon physical resilience as well as availability. To this end, the mobile device has been certified to comply with several international standards, including those set by the International Electrotechnical Commission (IEC) regarding heat, cold, vibration, shock and humidity.

In addition to services developed by DigitalCo themselves, other suppliers are also able to deliver their services via the platform following certification and testing – a process that usually takes about six months. DigitalCo typically form partnerships with external suppliers that utilise their platform, assuming responsibility for the link between customer and supplier in return for a monthly fee. DigitalCo has made it an explicit policy to not develop any services that imitate or infringe upon partner services, instead prioritising their continued existence and availability of their expertise. DigitalCo's approach is somewhat unusual in that most competitors offer integrated solutions where one device or system delivers one service supplied by one developer. Users that want more than one service (or services from different suppliers) therefore need to maintain several devices in parallel. The combination of reliable technology and a partnering strategy has made it possible for DigitalCo to benefit from the innovative services provided by third-party developers and seize significant market shares in several markets. The turn-over of the M2M business area has increased by a factor of four between 2006 and 2012, from €1.25 million to €5.25 million.

6   Results

In keeping with common practice in case studies (Eisenhardt & Graebner, 2007), findings are presented as a narrative interspersed with representative quotations. The theoretical framework is used to structure the results, using technology options, delivery system, client interface, and service concept as sub-headings.

6.1   Technology options

DigitalCoMobile was originally brought to market in 2000 as a niche product for secure wireless communications in tough conditions, e.g. exposure to harsh weather or vibrations produced by heavy machinery. The transition from product to platform for services has been cautious, with development of the mobile device motivated by a mixture of business requirements and technical proficiency. The overall

architecture of the platform has evolved in three distinct generations. The first generation may be considered a product through and through where resilience was a strong selling-point. The fact that there are still 1st generation devices still in active use a decade after DigitalCo discontinued its production is a testament to their success in that regard. In the mid 2000's, DigitalCo undertook a complete redesign of the mobile device in order to improve overall performance as well as accommodate new components that had become more capable as well as affordable in the years following the launch of the original product. Although necessary for the continued relevance and development of DigitalCoMobile, the redesign entailed the costly move of scrapping the entire architecture and starting from scratch.

"...if you look back at the first generation...the reason that it looked the way it did is because of the tools and technology that were available at the time. We didn't have 3G-networks and the like. It was limited by the technical possibilities available back then. [...] You could say that it was largely a prototype or proof-of-concept that everything could work together."

- Chief Operations Officer

While the 2nd generation made for a more a more capable device with a modular technical architecture, it did not scale well in terms of performance. This presented a problem as DigitalCo gradually grew more active in the provision of services as well as involvement with new industries. The existing hardware simply could not accommodate the workload required by certain new services – or combinations of services. A second major redesign of the device (in the late 2000's) did not prove as costly as the transition from generation 1 to generation 2, but did nonetheless involve discarding roughly 50% of the existing architecture. The current (3rd) generation of the mobile device is sufficiently flexible to enable a great variety of different user environments as well as permit incremental tweaks to a greater extent than previous generations. Although much attention has been directed towards improving the platform, long-term viability is dependent upon a tenuous balance between relevance in face of rapidly shifting technological developments and trends on the one hand, and maintaining an attractive price-point on the other. Customers are after all concerned with the services provided – not the hardware that enables them. The effort involved in designing and maintaining first-party hardware can at times place considerable strain on a small firm like DigitalCo that relies exclusively on in-house resources.

"A major challenge in owning a platform like this [...] is that we have the unique opportunity to conduct a lot of development ourselves and raise it to a higher level. But at the same time, we have to aware of the world around us. What new processors are on the way? This GSM-module is about to become obsolete – we need a replacement. We need [to utilize] 4G – are we backwards compatible with 2G? [...] How does all of this affect our applications? The platform is our strength, but we also have to be very perceptive as to how these problems are handled by the world around us.

- R&D manager

6.2   Delivery system

Being a small firm, cost control has been a priority at DigitalCo from the start. The initial interest in services, back in the early 2000's, was not motivated by adding value to customers, but rather a need to economise on post-delivery maintenance. In its original configuration, DigitalCoMobile did not support remote access which meant that even minor modifications had to be managed through direct physical access. Performing on-site maintenance soon proved to be both costly and cumbersome as the product was marketed as a durable communications device and as such installed in remote locations or in vehicles that saw constant use. Furthermore, unlike installation which is a one-time occurrence, maintenance is a recurring task. Prompted by rising costs of supporting their product, DigitalCo started developing ways to manage updates and routine upkeep remotely.

DigitalCo soon realised that their expertise in secure communications could be exploited for more than cost control. The ability to connect central offices with remote locations does not only save on maintenance, but also enables new means to supervise or govern machinery. The provision of infrastructure

can in these situations be a compelling commodity to many parties that lack the skill or inclination. The importance of uninterrupted communication is gradually dawning on customers as machine-to-machine communication grows more prevalent and cloud services more in vogue. The ability to provide a secure and robust link for communication is not only a means to enable services, but also an attractive offer in itself. DigitalCo has been able to leverage their skills to extract rents from both sides with suppliers paying for the use of the channel and customer paying for the device itself as well as maintenance and monitoring.

"A lot of people have developed fine applications. The experience has however been one of poor quality. It has often been the case that it is not the application that is poor, but rather the communication.

- Area Sales Manager

Much like its technical architecture, the communicative abilities of the mobile device has evolved considerably over the years. In some cases, the improvements have been a response to the general availability of better components or standards, e.g. the transition from 2G to 3G and now 4G networks, or switching to GPS-transponders that better or more affordable. At other times, improvements have been a direct response to business opportunities, such as the inclusion of a CAM-bus which was co-developed vehicle manufacturer following an explicit requirement. The ability to physically integrate DigitalCo-Mobile into user systems is essential to its ability serve as a dependable interface for services. However, physical integration is also a driver of costs since there is always manual labour involved where installation is concerned. While integrations that are repeated with some frequency can be standardised, the sheer diversity of customers and industries makes a "one size fits all" mentality difficult to apply in practice.

"For instance, one particular solution is intended to work with a truck – we've done that before. But it's pulling a salt spreader from the 1980's. We need [to pick up] signals from that as well, so we're back to customisation again. […] That's the way it is with our customers – machinery from the 80's meets tablet [computers] from last year."

- Business Area Manager

6.3   Service concept

DigitalCo's core competency may succinctly be described as getting data from point A to point B. Although significant, it gradually dawned upon them that proper exploitation of this capability required skills that they simply did not possess. With that in mind, DigitalCo adopted a different strategy in 2005 whereby in lieu of strict dependence on in-house development of services, they actively sought out partner-firms that possessed the requisite skills. More often than not, specific business opportunities were used as a means to provide tangible arguments with regards to the benefits of partnering.

Over the years, a loosely-coupled ecosystem has formed around DigitalCoMobile where firms combine their services based on customer requirements. While DigitalCo does not exert any real influence over their partners, their role as platform provider does give them certain insights into the problems faced by customers and even how many of the partners operate. While this knowledge could be exploited, DigitalCo has gone through lengths to make sure that the individual firms are able to operate knowing that its partners are not trying to copy or supplant its services. Nor is any form of exclusivity required, leaving the individual partner free to deliver their services via other platforms.

"...let us compare the ecosystem to an aquarium. The fish [...] represent partners. In that metaphor we are the aquarium. We have to make sure that nourishment and oxygen is supplied. We cannot let any predator get in, because it will eat the other [fish]. Translated into business we have to ensure that everyone in the ecosystem makes money. We're not supposed to hoard all of the profits. Compare this to a traditional approach where you work with a supplier that you squeeze to the very limit in order to

earn as much [profit] as you can. An ecosystem doesn't work that way because then that fish starves and disappears."

- Chief Executive Officer

Partner-firms are often small actors with deep understanding of certain types of services, e.g. optimising fuel-consumption or providing navigation. The range of applicability of these skill-sets varies greatly, but what is more to the point is that the partners sought out all add to the portfolio of services that DigitalCo is able to offer via their platform. The key to partnering in this manner is to ensure mutual advantage. Partners are adept at creating value-added services based upon their ability to extract useful information from the data generated in the user context. The physical linkage and transmission of data from user context to back-office system is usually not a part of their core competence or their business model. A partnership with DigitalCo essentially "black-boxes" this issue which permits the partner to focus what data is being transmitted rather than how it is transmitted. The addition of new services in the portfolio does however require a certain amount of integration and testing in order to ensure quality of service – a process that usually entails modifications to the platform as well as the service. Again, the labour needed to add a new service is rarely undertaken based on speculation, but as a result of a concrete business case to justify labour expenses. However, the one-time cost of integration and validation is outweighed by the ability to offer the same service to any customer with little additional expenditure. Adding more services also serves to affect customer perception as the price of DigitalCoMobile as a single-purpose product may seem quite steep, but is considerably more agreeable as an enabler of several different services. In essence, services and platform drive adoption of one another as customers want partner services, and once the platform has been physically integrated in the user context it is relatively easy to add new services.

"[...] so the customer might want a driver's logbook at first only to later realise that a system for work orders might be nice. We've got that in our ecosystem. People are gradually starting to understand the convenience of it. [...] You have to be active and work with retailers in order to get your offer out there and tell them it's all pre-packaged."

- Area Sales Manager

6.4   Client interface

In addition to an extended portfolio of services, an ecosystem of business-oriented partnerships has enabled DigitalCo to move away from situation where they were effectively retailers of hardware. Not only are customers growing increasingly disinclined to accept significant up-front expenses for a single-use product, it is also difficult to explain the merits of a device that does not readily convey a sense of utility. An increasing proliferation into different industries has involved comprehending the mind-set of a new range of customers. While past business-deals were largely conducted between engineers, it is now a matter of selling intangible services to customers with a wide range of skills and perspectives. As the ability to discuss technical details has diminished, DigitalCo has found it necessary to engage with users on a more general level, e.g. by steering the conversation towards the user's business environment and the real-world issues they are facing. It can be challenging to establish a rapport and outline the link between platform, services, and their potential to solve user problems.

"...nobody is really in the market for a platform. What they want is a solution. [...] If you then look at public transportation – the bus-ecosystem – there we've learnt how the industry works in the Nordic countries in order to supply the functionality that they actually want from this platform. In doing so it has suddenly turned into a solution."

- Business Area Manager

Backed by an ecosystem, DigitalCo is able to rely on partners to handle much of the initial as well as ongoing interaction with customers. In addition to reducing DigitalCo's work-load, having partners cultivate their own relationship with a customer serves two important purposes.

First, a package of services delivered via DigitalCoMobile is likely to originate with a number of different partners, the role of which may vary in different situations. A partner that has extensive experience from a particular industry is likely to comprehend or even predict the needs of certain customers, yet find it challenging to understand the potential of their service(s) in other situations. The ability to provide customer solutions in a variety of industries means that you also need to permit skilled partners to "take lead" and facilitate the transition from technical specifications to customer solution.

Second, the flexible nature of digital services creates significant potential for adaptability, but also requires a certain amount of trust and shared understanding among partners. As solutions are by definition dependent upon customer as well as context, DigitalCo does not have a fixed set of partners that "own" a particular type of services. At times, this has led to participating in more than one bid with different partners for a single contract. Maintaining a balance under these circumstances can be a challenge, but the recurring theme is to cooperate in putting together a complete package of services suited to customers where possible without displacing any existing supplier-consumer relationships.

"The key to providing a platform…is to stand up for what a platform is. That is the foundation. It's often a matter of finding the right building blocks […]. In order to make it work you have to talk to each other […] so that you speak the same language and take an interest in one another. Then you know what piece of the puzzle that you yourself are."

- Area Sales Manager

6.5   Summary of results

The following table provides a brief summary and overview of the most significant findings from the study of DigitalCo.

Client interface	Focus on business solutions rather than technical specifications Customer intimacy determines partner visibility Flexible ecosystem rather than fixed value chain
Service concept	Tangible business opportunities as basis for partnerships Core competency leveraged for service platform Ecosystem to exploit external capabilities
Delivery system	New industries require new options for integration Priority shift from internal efficiency to business efficacy Strong influence from technological trends
Technology options	Device an original design based on off-the-shelf components Evolutionary steps from product for communication to platform for services Redesign prompted by need for flexibility as well as performance

Table 1.   Key findings in case study.

7   Discussion

This paper offers a single-case study of a firm that over the course of a decade has transitioned from purveyor of niche products for secure communication to provider of a digital service platform that is applicable across several different industries. In an effort to understand the influence of context on platform development, I employ servitization as a theoretical framework and build upon previous work by

den Hertog (2000) and Chesbrough (2011) that advocate a layered approach whereby service-provision is divided into a back-end that enables repeatability, and a front-end that facilitates customisation.

7.1   Implications for theory

The applicability and benefit of platforms are well-established in literature and practice (Gawer, 2009). They can serve as flexible means to balance mass-production with customisation as well as mitigate transaction costs associated with doing business. Even so, platforms are by nature vicarious entities that enable actions and create opportunities rather than provide direct answers or solutions (Taudes, Feurstein & Mild, 2000). As such, they do not readily lend themselves to commercial offerings in the same manner as a product or service that with a more limited scope may convey a clear sense of purpose. The application of a platform is the outcome of a multi-party process between customer, complementor, and platform provider, where all parties come to an agreement on what value entails in a specific situation. However, while extant literature acknowledges the rich applicability and malleability of platforms, it is still hampered by an underlying assumption that actors have fixed roles that are static over time (Gawer, 2014). The notion of fixed roles may simplify certain types of analyses, but roles are always ambivalent as actors constantly exchange value propositions that may affect the configuration of a relationship (Lusch & Vargo, 2014). If one considers the value propositions that affect platform adoption and development, we are left with a novel perspective on the dynamic environment to which the platform has to adapt.

First, value propositions are *multidirectional* insofar as platform providers are effectively wedged in-between customer and complementor. Even though one acknowledges that customers and complementors are not rigid groups of actors, it is still necessary to offer compelling value propositions amenable to both types of relationships with external actors in an effort to keep the platform viable (Evans, 2009). Depending on the situation, a platform provider may be considered a simple delivery mechanism between two parties, a partner in quality testing for new offerings or innovations, or a solution-provider that aggregates disparate resources in accordance with customer preferences. In each case, the platform provider offers a different value proposition that outlines distinct relationships that are enacted through the platform. Conversely, relationships with external stakeholders also entail value propositions being presented to the platform provider. A firm that wishes to offer a complement via the platform must not only offer a compelling value proposition to the prospective customer, but also the platform provider that has to facilitate the connection between the two parties. The nature of the value proposition presented to the platform provider may be as simple as conforming to established rules and protocols (e.g. Ghazawneh & Henfridsson, 2013), but it can also be more substantial if the intended complement requires platform alterations. The platform provider must then decide whether the suggested complement holds sufficient business-potential to warrant the costs associated with its accommodation.

Second, value propositions are *multidimensional* as the properties of a digital platform are also subject to the rapid evolution of digital technology (Wareham et al, 2014). Opportunities offered by new components and tools cannot be adopted willy-nilly, but require careful consideration in order to promote consistency between business decisions and technology decisions. The platform provider must in addition to external stakeholders also be aware of emerging trends and regulatory restrictions in the external environment (Tiwana et al, 2010). Both factors can be highly complex when faced with the asynchronous development of infrastructures, standards, and technologies (Yoo et al, 2005). Although neither technology diffusion nor industry trends originate with any single source, they offer a myriad of opportunities and inputs that from the platform provider's perspective must be addressed in a manner similar to value propositions. Both factors have a direct impact on the platform's physical design and market orientation, determining what possibilities the provider has to enact services down the road. Hence, one can argue that value propositions can be presented by non-human actors, similar to the actant-concept found in actor-network theory (Monteiro, 2000).

Third, *intra-organisational* value propositions are a means for the platform provider to balance the difficult balance between economies of scale (repeatability) and economies of scope (variety). As platform-providers differentiate between an enabling back-end and adaptive front-end, value propositions may circulate within the platform provider itself relating to either business requirements or technical possibilities. Significant design decisions, e.g. whether to pursue synergies between different components or maintain loose couplings may have significant impact on business opportunities as well as future platform development (Schilling, 2000; Woodard et al, 2013). In a business climate where value is increasingly co-created and clear organisational boundaries give way to shades of grey, the notion of value propositions may prove a useful complement to concepts like business-IT alignment (Henderson & Venkatraman, 1993; Chan & Reich, 2007) as a means to guide the linkage between business strategy and technology capabilities.
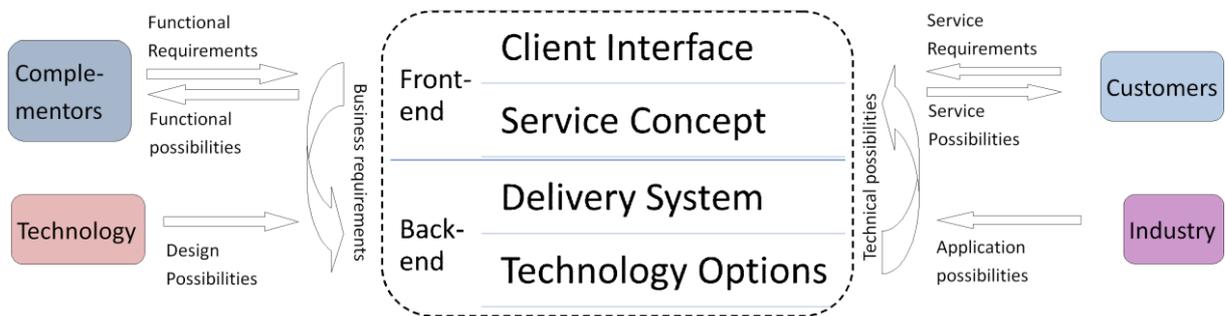

Figure 3.   Value propositions influencing a digital platform.

7.2   Implications for practice

Extant literature depicts the establishment of a new platform as a process of "coring" where a niche is carved out in the marketplace. Gawer (2009, p. 66) outlines requisite steps to a successful coring strategy, including the identification of "an element with platform potential" following which one proceed to "build a coalition" of supporters. Thomas et al (2014) provides additional detail by suggesting three distinct leverage logics available to the platform provider – production, innovation, and transaction – that are each imbued with their own rationale and set of priorities. Theoretical guidance notwithstanding, knowing what strategy to pursue represents a potent challenge to any platform provider, but especially so for formative platforms as their only existing resource is the stand-alone functionality of the basic offering (Schilling, 2009). The value proposition concept may provide a complementary, more business-oriented perspective on how to identify and pursue the requisite functionality for platform development. The prospective provider is then able to weigh different design options and business strategies against what is actually sought in the marketplace (Lehoux et al, 2014).

In addition to value propositions, the concept of servitization may hold particular salience for digital platforms. Servitization is based on the premise of taking an existing product and enhancing its appeal by adding services that somehow enhances its appeal, e.g. by reducing maintenance or extending efficacy (Vandermerve & Rada, 1989; Oliva & Kallenberg, 2003). One may question its compatibility with strict interpretations of service-dominant logic as the latter perspective does not distinguish between the exchange of physical goods or immaterial services – all manner of exchange is simply "service" where one party applies its resources for the sake of another (Lusch & Vargo, 2014; Barrett, Davidson, Prabhu & Vargo, 2015). However, it is precisely the distinction between material and immaterial (here reinterpreted as digital) that makes servitization a relevant perspective for the development of digital platforms. As digital devices are reprogrammable, it is entirely possible to enhance or alter their functionality without changing their physical configuration. Oft-cited examples include the pervasive use of smartphones that may very well be marketed as products, but act as platforms for a wealth of digital complements

(Eisenmann et al, 2009; Ghazawneh & Henfridsson, 2013). In other words, the distinction between digital product and digital platform is becoming increasingly blurry to the point where adding (digital) services to your digital device is more a matter of volition than ability.

7.3   Limitations and future research

The present study depicts a platform where the digital device and corresponding back-office system are adapted to one another. That is however just one of several possible configurations of digital platforms. One need only look at handheld consumer devices (Ghazawneh & Henfridsson, 2013), video game consoles (Eisenmann, Parker & van Alstyne, 2006) or operating systems (Schilling, 2009) to find alternate forms of platforms that are enabled by digital technology. It would therefore be interesting to study the relevance and dynamics of value propositions in situations with alternate arrangements, e.g. online marketplaces that are wholly hardware-agnostic and users may access content using any number of devices.

Although the present study depicts the manner in which a contextualised sense of value impacts the development of a product into a platform, the case also hints at an opportunity to more fully explore the services that are provided. Despite the prevalence of services in developed countries, research on platforms for services is still in its infancy (Thomas et al, 2014). As digital technology holds significant potential to provide a platform for services (Lusch & Vargo, 2014; Lusch & Nambisan, 2015), explicit attention to this phenomenon is long overdue.

8   Conclusions

Digital platforms face a complex set of requirements as they must accommodate the diverse interests of several types of stakeholders as well as remain relevant despite the rapid development of digital technology. As extant literature offers limited guidance, this paper applies a theoretical framework based on servitization in order to discern how value propositions can inform platform development from the perspective of the platform provider. The framework has been applied to a case study of a firm that has transitioned from a supplier of products to a provider of a platform for digital services. Findings suggest that the subjective nature of value coupled with the multifaceted nature of value propositions may inform our understanding of platforms in general and digital platforms in particular. The platform provider must develop and cultivate values that appeal to external actors (i.e. complementors and customers) if the platform is to serve its purpose. However, as the platform is dependent upon physical artefacts in order to host services, we may also discern that business opportunities associated with a service must be sufficient to offset any technical development. We may therefore surmise that value propositions in digital service platform are multidirectional as well as multidimensional. Also, we may also see that value propositions circulate within the platform provider as the organisation strives to balance its front-end activities with an enabling back-end.

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