HUMAN-CENTERED BUSINESS MODELS FOR PLATFORM OPERATORS IN PERSONAL DATA MANAGEMENT

Laura Kemppainen, University of Oulu, Oulu Business School
Timo Koivumäki, University of Oulu, Oulu Business School
Saila Saraniemi, University of Oulu, Oulu Business School

ABSTRACT

In this paper, business model is described as a framework of actors, roles and interactions in the ecosystem. The purpose of this paper is to examine what kind of business models there are for platform operators in MyData based service ecosystem, in which individuals are in control over their personal data and can exchange and store the data for their own purposes. We suggest novel business models for platform operators and highlight the role of MyData in value co-creation among the actors as well as illustrate how the ecosystem is shaped from a platform operator's perspective. The method applied is a qualitative case study. We argue that platform operators play a central role in the ecosystem as enablers of value co-creation in the context of MyData as they enable individuals to take control over their data, build trust frameworks, facilitate interaction and offer value-adding services for the network of actors. The paper contributes to the discussion on networked business models and creates new knowledge about human-centered business models for platform operators in personal data management.

Keywords: Business model, Platform operator, Service ecosystem, MyData, Role, Value co-creation

Competitive paper.

INTRODUCTION

Ecosystems are constantly evolving and transformed by actors taking an active role in designing their future rather than leaving it to change. When the aim is to design a future of collaborating and value co-creating actors, a human-centered approach is needed (Frow et al. 2016) that emphases the active role of individuals in the ecosystem (Palo & Tähtinen 2011). In the current personal data ecosystems, individuals are not active but are treated as passive actors who have no control over how their personal data is used in the ecosystem and how, for example, companies or the government use or create data about them and their activities. Instead, companies are constantly collecting large sets of data about us, saving the data to their own databases and using the data for their own purposes for example for advertising. (Poikola, et al. 2015, Weber 2015, Katell et al. 2016.)

One way to change the future of personal data ecosystem is to move from organization-centered model towards human-centered personal data management and towards an ecosystem in which the individual is in the position of being his/her own data controller (Eichelberg et al. 2005, Gnesi et al. 2014, Papadopoulou, et al. 2015). Even if the need for new models is acknowledged (c.f. Spiekermann & Novotny 2015, Weber 2015), there is still lack of research on business models in this field. Therefore, we argue that research on new emerging human-centered models is needed. One example of human-centered personal data management models is MyData that aims to provide individuals with a way to control their personal data. Giving control over data to individuals opens opportunities for new kinds of businesses and business models in the ecosystem (Poikola et al. 2015) and especially for platform operators, which are intermediaries that create value for the ecosystem by facilitating data transactions and other interactions among the network of actors (Iansiti & Levien 2004, Bakos & Katsamakas 2008, Osterwalder & Pigneur 2010, 77, Eloranta & Turunen 2015) by providing the actors with the infrastructure, services, rules, tools and/or technologies (Iansiti & Levien 2004, Bakos & Katsamakas 2008, Osterwalder & Pigneur 2010, p. 77).

The recent service-dominant logic (S-D) research around the topic has already begun the discourse of value co-creation, interaction and service exchange enabling platforms (see e.g. Lusch & Nambisan 2015, Breidbach et al. 2014). Previous research has discussed about platforms' business models and multi-sided markets, but the research is still focused on revenue models (see e.g. Osterwalder & Pigneur 2010, p. 78, Mettler & Eurich 2012) or on privacy and ownership issues of personal data (c.f. Weber 2015, Spiekermann & Novotny 2015). Also, most of the research on business models adopt the perspective of one firm rather than recognising the network of actors, which is an important element of a business model (Palo & Tähtinen 2011). This research increases understanding about service platforms and platform operators by taking account the whole service ecosystem, which is important when extending the viewpoint to interactions between multiple actors (Vargo & Lusch 2011).

In this research, business model is seen as a framework of actors, roles and value exchanges or interactions among the actors in the ecosystem, which have been recognized as the core elements of business models (see eg. Komulainen et al. 2006, Weill & Vitale 2001, Timmers 1998). As a result, this research suggests novel MyData based business models for platform operators by describing different roles and other actors in the ecosystem. The research highlights the role of MyData in value co-creation among the actors and illustrates how the ecosystem is shaped from a platform operator's perspective.

Purpose of the paper is to examine what kind of business models there are in the human-centered personal data management ecosystem where individuals are in control over their personal data. Method applied in this research is qualitative case study. The research is based on 22 open-ended questionnaire answers from commercial companies, non-profit organizations and public bodies from Europe and the US. The questionnaire is conducted by the European Commission as part of their effort to gain better understanding on the current landscape of services offered in Europe. The research contributes to understanding about how the emergence human-centered personal data management can be supported with platform operator's business models in the service ecosystem.

This paper is structured as follows: First, business models are discussed especially from the network and service ecosystem perspectives and after that, platforms and the service ecosystem are defined. Next, human-centered personal data management approach and the actors and roles identified in previous studies are presented for example in the contexts of innovation networks (see e.g. Nyström et al. 2014) and mobile virtual communities (see e.g. Pawar et al. 2008). Next, we will introduce the method applied and introduce the case study. Finally, the key findings of this study, limitations of this research and future research avenues are presented.

LITERATURE REVIEW

Business model

Already over ten years ago Osterwalder et al. (2005) claimed that business models are not very well understood in a research. Since that, scholars from several fields have researched the topic of business models, but the term is not always consistently applied (Wirtz et al. 2015) and the use of business models depends on how they are perceived by the company (Palo 2014). Along with a term "business model", terms such as "business idea", "business concept" or "revenue model" are being used (Magretta 2002).

Business models can also be viewed from many different perspectives: an open business model puts a customer to the center and is focused on multiple actors co-creating value for the same customer (Frankenberger et al. 2013), whereas the organization-centered model of Osterwalder and Pigneur (2010, p. 14–17) describes how an organization creates, delivers, and captures value through nine "building blocks", and finally a networked perspective, or "actors and interactions" as a research area on business models (Wirtz et al. 2015) emphasizes the different actors, their roles and value exchanges among the actors (Komulainen et al. 2006). However, research concerning actors and their interactions in the context of business models is still neglected (Wirtz et al. 2015). Still, there are scholars that consider actors, interactions and roles as the core elements of a business model. According to Komulainen et al. (2006) the elements of a business model are the product or service, actors and their roles and value-creating exchanges among them. Weill and Vitale (2001, p. 25, 34) also define a business model as description of roles, benefits to stakeholders and digital connections among a company's stakeholders through which product, information and money flows. Similarly, Timmers (1998) identifies flows of information, actors and their roles in the description of a business model. It is also argued that companies offering technology-based services need a business model that is considered as part of a network (Palo 2014). In short, a business model describes the actors and roles as well as the interactions in the ecosystem,

meaning flows of resources, activities or benefits (Palo & Tähtinen 2011). In this research, business model is seen as a framework of actors, roles and value exchanges or interactions among the actors in the ecosystem.

Platform as an enabler of interaction

Platform operator is an intermediary that creates value for the actors in the ecosystem and enables value co-creation among the actors (Prahalad & Ramaswamy 2004, Chandler & Vargo 2011) by enabling and facilitating interaction among network of actors by providing an infrastructure, services, rules, tools and/or technologies (Iansiti & Levien 2004, Bakos & Katsamakas 2008, Osterwalder & Pigneur 2010, p. 77, Eloranta & Turunen 2015). Platforms are multi-sided in nature (Rochet & Tirole 2003, Tan, Pan, Xianghua & Huang 2015), meaning that a platform interconnects together two or more interdependent groups of customers from both sides of the market: the consumer and the producer of the content, good or service. Google and Facebook are examples of successful platforms. (Osterwalder & Pigneur 2010, p. 78–79.)

Differing from value co-creation platforms that can be understood as physical places where value is co-created (like a workplace or a park) (Uhrich 2014), service platforms are physical or virtual customer touch points (Breidbach et al. 2014), or modular structures (Lusch & Nambisan 2015) that support actors in exchanging and integrating resources (Breidbach et al. 2014) as a venue for service exchange (Lusch & Nambisan 2015) and as the center of communication and interaction of participants (Pawar et al. 2008), and thus co-create value in a service ecosystem. The interaction can either be customer-to-firm or customer-to-customer. Platforms can also be categorized to transactional or interactional, depending on if the resource exchange on the platform is temporary or continuous. (Breidbach et al. 2014.)

Osterwalder and Pigneur (2010, p. 78-79) argue that a platform creates value by acting as an intermediary between the two groups and the value can be created only if the platform attracts and serves all the customers at the same time. They also argue that one of the most important questions for a platform operator is whether it can attract enough of customers for both sides of the platform.

In a platform model, there are two types of customer groups in a market that interact with each other and an intermediary, which provides a platform and enables customers to meet each other (Choi 2010). The users, who define the sides of the market, can either be producers of the content, good or service on the platform, or consumers. Hence, the platform model consists of a platform, operator and the two user groups. Figure 1 illustrates the relationship of the classes and the flows of value created by platform use. The model suggests that the flows of value motivate decision makers in each class to interact. Users derive value from conducting a single transaction that the platform supports. This value may be different for producers and customers. Users benefit from interacting on the platform, and pay fees to the operator. (Beyeler et al. 2012, p. 316–317.) However, differing to the figure below, Zhang, Levä & Hämmäinen (2014) highlight that the value flow is not only one-way but it's in fact two-way, meaning that customers can interact with the platform by giving information and making monetary transfers and in return receive content from the producer via the platform.
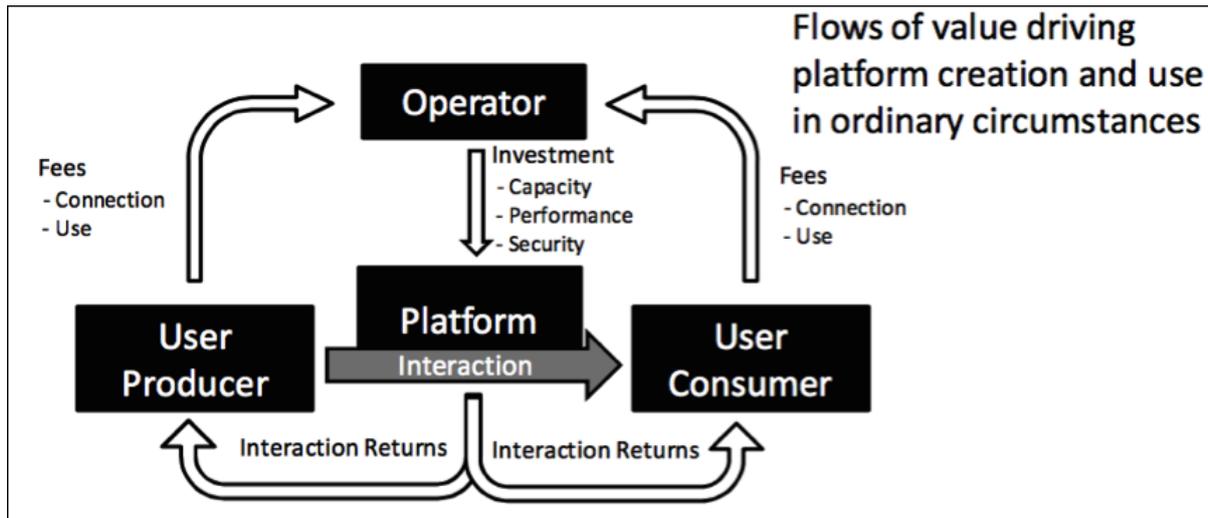
Figure 1. Main classes and flows of value in the platform model. (Beyeler, Kelic, Finley, Aamir, Outkin, Conrad, Mitchell, & Vargas 2012, p. 316).

Service ecosystem

S-D logic points toward the need to think about service ecosystems and value creation taking place in the ecosystem when trying to understand about a dynamic and changing environment (Vargo & Lusch 2011). A service ecosystem is defined as an independent and self-adjusting emergent actor-to-actor network that has structures and social rules, which is created and recreated collectively by connected actors and in which actors co-create value by service exchange (Lusch & Nambisan 2015). Furthermore, a service ecosystem is a sensing and responding structure of actors that interact through institutions, technology and language to co-produce and exchange service offerings and co-create value (Lusch, Vargo & Tanniru 2010, Vargo & Lusch 2011).

Common organizational structures and principles are important in order to facilitate service exchange and resource integration among actors in a service ecosystem. Actors are relatively free to enter and exit the service ecosystem, collaborate with each other and exchange with other actors (Lusch & Nambisan 2015). Similarly to the recent research on service ecosystems by Frow et al. (2016), we refer to actors and not stakeholders, highlighting that an ecosystem includes many other stakeholders than only the customers and service providers and, we also refer to an ecosystem and not to a network, because it's widely used in previous S-D logic research (see e.g. Frow et al. 2016, Lusch & Nambisan 2015).

According to Grönroos and Helle (2012) it is not enough that actors try to be productive separately but they should strive to become productive together by co-creating value. In order to understand if, how and why platforms enhance resource exchange and integration, we need to move from a singular perspective toward understanding of ecosystems (Breidbach et al. 2014). For example, resources like knowledge create value only by connecting actors, thus the value isn't in the resource itself (Hunt & Morgan 1995). Furthermore, the resources cannot be owned or controlled by a single actor but they are influenced by multiple actors through service intermediaries (Rindfleisch & Moorman, 2001, Chandler & Vargo 2011), like platform operators.

In a service ecosystem, actors integrate and exchange resources and simultaneously serve actors in "a set of unique actors with unique reciprocal links among them" (Carrington, Scott & Wasserman 2005, Chandler and Vargo 2011). Each actor will bring something new to the context and affect to other actors as well as the whole context with the individual co-creation efforts. Value co-creation is influenced by context that again influences the service and resources. Understanding the connections between the actors is crucial, because the connections will eventually affect to how the resources can be used for services. The complex connections that actors have with each other provide a context to experience value. However, specific actor perspective to the value co-creation can be understood only within the actor's context (Chandler & Vargo 2011). In this research, a platform operator's point of view to value co-creation in MyData based ecosystem is taken.

Human-centered personal data management

Traditionally, in the organization-centered model, platform operators are regarded as unreliable actors that are not transparent and use individual's data for the use of their own good (Alt et al. 2015). Because of the great value of individual's personal data, data is being gathered on a larger scale by companies and it is shared across companies and markets (Feijóo et al. 2014). However, these business models that are based on individuals' personal data are unsettled, since people lose trust on companies that have data breaches and abuses (Spiekermann & Novotny 2015).

The emerging trend in personal data management is to move from an organization-centered model to more individual-centered that enables individuals to store and access their own data and thus enabling them as data subjects to be the data owners (Papadopoulou et al. 2015, Eichelberg et al. 2005). MyData approach (c.f. Poikola et al. 2014) is suggested as one vision of these human-centered models. It is an approach of organizing personal data that allows individuals to access and control the data that is collected about them (Poikola et al. 2014) and minimizes the privacy lost from the individual's perspective (Poikola et al. 2015). In a traditional model for example in healthcare context, transferring own health information from one healthcare service provider to another is impossible, because people are not able to access to their own data (Poikola et al. 2014). When moving towards an individual-centered model and thus empowering individuals and increasing their ability to control their own data would open opportunities for new business models for companies in different sectors (Poikola et al. 2015) as well as, in the healthcare context, would increase individuals' motivation and opportunity to take care of their health (Mandl et al. 2007, Baudendistel et al. 2015).

Actors and roles

According to Mettler and Eurich (2012), when analyzing business models, a description of actors involved is crucial. Identifying actors is the first step in building successful relationships among them (Frow & Payne 2011), but there is no clear structure of identifiable actors or roles in the ecosystem (Möller & Svahn 2009).

In the service platform level in the context of MyData based digital services actors include software and service operator, device provider, patient record data systems and public and private actors in the field. Other actors include individuals, service providers, support service providers as well as business service infrastructure providers and data storage service

providers. (Koivumäki, Pekkarinen, Saraniemi, Heikka & Lappi 2015.) Pawar et al. (2008) define three primary types of actors in the business model for mobile virtual communities: customers, providers and a community platform operator, which provides an infrastructure and means for the interaction between the consumers and service providers. In S-D logic, actors are seen as resource integrators, who recombine existing resources like knowledge or infrastructures. Actors can have multiple roles in resource integration. (Lusch & Nambisan 2015.)

According to Iansiti and Levien (2004), platform operator's role affects to the success of the platform. Because the MyData model is still in emerging stage and has not yet achieved market maturity (Poikola et al. 2014), it is necessary to take the perspective of "intention of doing" to the roles, meaning examining how the actors intend to act in the future and what roles they will adopt. In this research, actors, meaning organizations and users in the network, are considered as collections of different roles (Montgomery 1998) that can be identified by describing the intentions of business actors and their preferences of changing a network by acting in a specific role (Anderson, Havila, Andersen & Halinen 1998).

Koivumäki et al. (2015) have suggested three roles for service platform operators in the context of MyData based digital services: an enabler of individual service offering and value co-creation, a coordinator and a gatekeeper. Furthermore, a recent study by Eloranta and Turunen (2015) suggests different roles (or logics) for platforms in the context of service-driven manufacturing: connecting actors, integrating systems and sharing resources, for example encouraging actors to provide access to each other's resources and building trust between the actors.

Nyström et al. (2014) have studied roles in the context of innovation networks, in which, similarly to service ecosystems, actors can take multiple different roles (Lusch & Nambisan 2015) and in which some kind of intermediaries among the actors is needed. According to Nyström et al, an organization may take a role of a coordinator, builder, messenger, facilitator, orchestrator and integrator. Coordinator acts as a "focal network hub", coordinates participants in the network and acts as a representative of a certain group of actors, for example the users. It collects information for example about the user needs and desires and then forwards the collected information to the other actors in the network. Messenger collects ideas from coordinators and other actors and forwards information and good ideas to the network. (Nyström et al. 2014.) Knight and Harland (2005) call these as information brokers. Builders, on the other hand, establish close relationships between actors, such as users and companies in the network, and a facilitator gives advice for actors of how to reach their goal and how to find the right direction. Orchestrator guides and supports network activities, establishes trust in the network to boost collaboration and inspires actors to work for the good of the network by acting as an example. Orchestrator orchestrates the whole network of actors. Integrator, on the other hand, integrates actors' knowledge, technologies and other recourses and outputs into a useful entity. (Nyström et al. 2014.)

In sum, the previous research concerning business models, platforms and service ecosystems are varied and no specific framework for roles, actors and their interactions can be found as the roles taken or given in an ecosystem are context-specific. Therefore, the roles, actors and interactions have to be studied in a context. In this research, business models for platform operators are studied in the context of MyData in order to increase understanding of what kind of business models there are in an ecosystem where individuals are in control over their

personal data. In the next section, the research method applied and the selected case study is discussed.

RESEARCH DESIGN

Research concerning new alternative or complementary perspectives to ecosystems and technology-enabled interactions among companies and customers is still needed (Breidbach, et. al 2014). This research fills the research gap by focusing on platform operator's business models in the context of MyData and takes into account the ecosystem as a whole meaning interactions among network of actors as well as operator's roles in the network. This is a single case study. The study consists of multiple interdependent variables in complex structures and therefore choosing single case study allows the researchers to go deep in one case (Dubois & Gadde 2002). We chose case study, as it allows us to investigate a contemporary phenomenon in a specific real-life context (Runeson & Höst 2009, Yin 1981), and has been widely used and found suitable in previous research on business models in platform businesses (e.g. Enders, Hungenberg, Denker & Mauch 2008, Pawar et al. 2008, Muzellec et al. 2015;), in research about platforms and ecosystems within S-D logic (e.g. Breidbach, et. al 2014) and is suggested to be a suitable method in industrial marketing in general (Dubois & Gibbert 2010, Piekkari, Plakoyiannaki & Welch 2010).

Case of this research is the platform operator's service ecosystem. In a service ecosystem, actors interact through institutions and technology to co-produce and exchange service offerings and co-create value (Lusch et al. 2010), and according to MyData principles, provide individuals with a way to control their personal data. In MyData model, data flows from a data source to a service or application with the consent of an individual. (Poikola et al. 2015.) Ecosystem is a framework that bundles together actors, an actor network and platforms via which actors can interact with each other and exchange skills and knowledge. (Lusch & Nambisan 2015.) The unit of analysis is an organization in the MyData based service ecosystem.

The questionnaire was designed by a representative from the European Commission with collaboration of a MyData and open data researcher within the same research project as the authors of this paper. They both have close and broad connections around the world with organizations and companies that work with or research human-centered personal data management. After designing the questionnaire, it was sent to those companies and researchers that are offering personal information management services in Europe or supporting the model and ecosystem of human-centered personal data management in November 2015. The questionnaires were implemented as part of European Commission's effort to get better understanding about the emerging ecosystem of human-centered personal data management, of which MyData is an example.

The data consist of 22 open-ended questionnaire answers concerning personal information management architectures. Questions covered the topics of personally controlled data and business models in the field. The respondents were from 10 different countries from Europe and two from the US. They were organizations or companies that are closely working with, researching or offering personal information management architectures. Ten of the respondents were commercial companies, five research organizations, two public bodies and five organizations answered to be none of the above. Table 1 lists the respondents, including their organization type, primary customer audience and country. The questionnaires consisted

nine questions and they were open, excluding few questions about the organization type, its customer audience and technological readiness of the company's offering. However, the respondents gave long open answers even in some of the closed questions. The questionnaires were divided in three parts as follows: 1) About your organization (business model, value proposition, service offering and the customer audience), 2) About personal information management architectures (assessing technological readiness of own model and describing a convincing business model in order to obtain a ROI) and 1) What do you expect from the public sector?

Company	Organization type	Customer audience	Country
Company 1	From a commercial company whose core business is to develop and offer personal information management architectures or substantial parts	individuals, companies	Switzerland
Company 2	From a commercial not-for-profit cooperative whose core business is to develop and offer personal information management architectures or substantial parts	individuals	Switzerland
Organization 3	A researcher/ a research organisation and my/ our research is closely connected to personal information management architectures	individuals, companies	US
Company 4	From a commercial company whose core business is to develop and offer personal information management architectures or substantial parts	individuals, companies	UK
Company 5	From a commercial company whose core business is to develop and offer complete personal information management ecosystem architectures	individuals, companies, business analytics companies	Belgium
Organization 6	None of the above but representatives of an independent non-profit foundation	individual users, companies and governmental organisations	The Netherlands
Organization 7	None of the above but a Community Interest Company, a social enterprise	individuals, companies, business analytics companies	UK
Organization 8	a public body	-	UK
Company 9	From a commercial company whose core business is to develop and offer personal information management architectures or substantial parts	individuals, companies, business analytics companies	UK
Organization 10	None of the above but from a non-profit organization	individuals	Spain
Company 11	From a commercial company whose core business is to develop and offer personal information management architectures or substantial parts	individuals	Denmark
Organization 12	None of the above, but… a non-profit organisation	companies	UK
Company 13	From a commercial company that has another core business but develops/ experiments with/ supports the roll-out of personal information management architectures	-	UK
Organization 14	A researcher/ a research organisation and my/ our research is closely connected to personal information management architectures	-	UK
Organization 15	A researcher/ a research organisation and my/ our research is closely connected to personal information management architectures	-	Finland
Company 16	From a commercial company whose core business is to develop and offer personal information management architectures or substantial parts	individuals, companies, business analytics companies	France
Company 17	From a commercial company whose core business is to develop and offer personal information management architectures or substantial parts	individuals, companies	Austria
Company 18	From a commercial company that has another core business but develops/ experiments with/ supports the roll-out of personal information management architectures	individuals	Spain
Organization 19	A researcher/ a research organisation and my/ our research is closely connected to personal information management architectures	-	US
Organization 20	A researcher/ a research organisation and my/ our research is closely connected to personal information management architectures	-	Denmark
Organization 21	None of the above but a non-profit think & do tank	-	France
Organization 22	a public body	-	UK

Table 1. Respondents of the questionnaire from 10 countries.

Qualitative software Atlas.ti is used in the coding and the analysis process. The software focuses on relationships between codes and data. (Lee & Fielding 2009, p. 532.) With the help of the software, the analysis is made by coding the empirical data, and thus tagging the text and giving the text a meaning (Bandara, Gable & Rosemann 2005). The coding process

of this research is similar to previous qualitative case study by Bandara et al (2005) in the context of business process modeling. In phase 1, the data was coded. In phase 2, the coded data was analyzed, suitability of the categorization was confirmed and codes were refined. In phase 3, higher categories emerged from the text, which were used in the empirical analysis in the next section.

PLATFORM OPERATOR'S BUSINESS MODEL

We present the key findings of the case study in the following sections, starting with Figure 2 that illustrates the service ecosystem of a platform operator in the field of MyData, including the actors, roles of a platform operator and interactions. A platform operator facilitates interaction between an individual, data providing and data using organizations and enables value co-creation among the actors. Value co-creation is generated in-use in the interactions for example when the individual provides service providers or research organizations with own data via a platform in return of value, like a reward or service. Individuals may access to their own data and use it for their own purposes. On the other hand, an organization will gain trust among the individuals. Other interactions are the data, consent and money flows between the actors, which are illustrated with arrows. Other actors identified in the ecosystem are policy developers, public organizations and technology providers that support the ecosystem by providing the actors with technology and by setting common rules in the ecosystem.
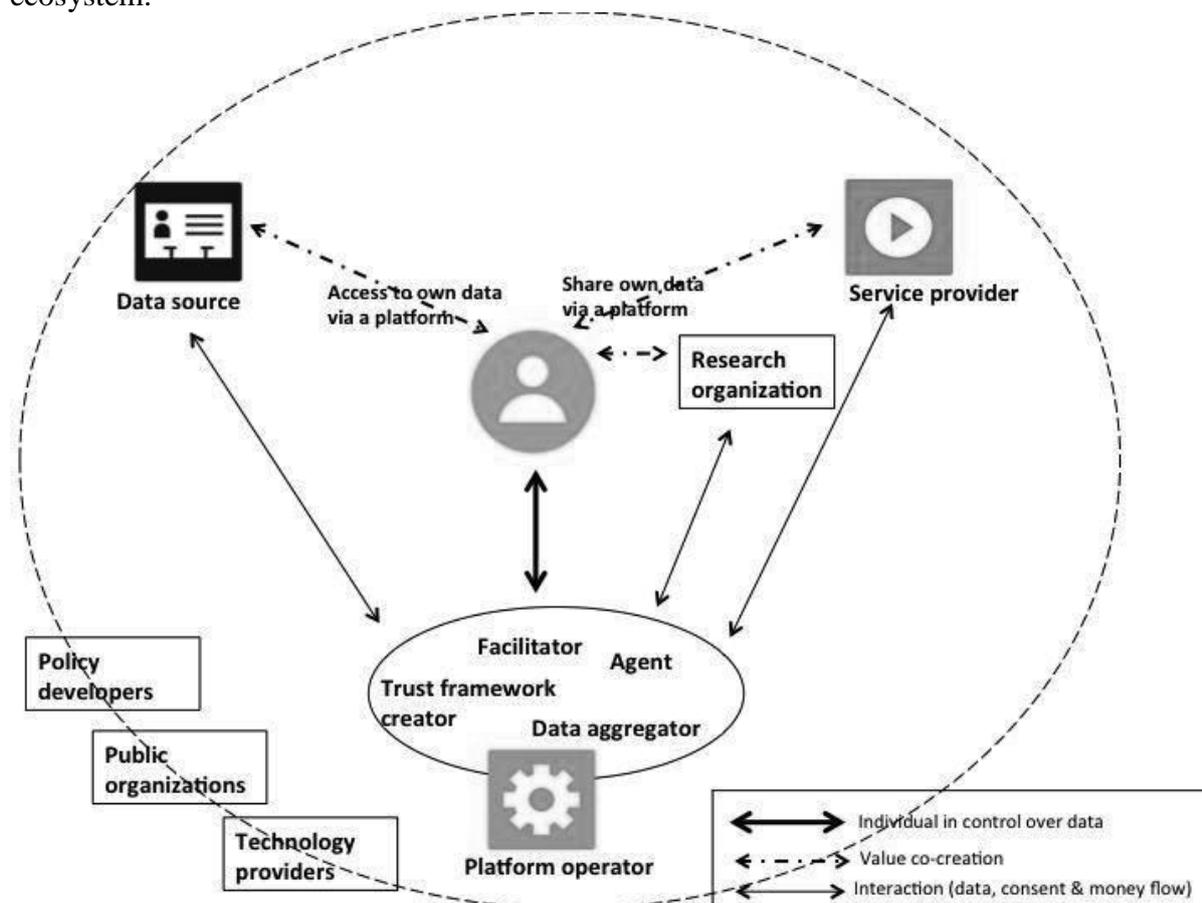

Figure 2. Platform operator's service ecosystem including the roles of a platform operator, other actors and interactions among them.

Actors

In this study, the respondents included actors such as research organizations, platform operators, commercial service providers, public organizations, consultancies, policy developers and technology providers. Four different kinds of operators were identified: 1) those offering consent and data management services for individuals and companies, 2) digital identity providers, 3) trust framework creators and 4) those offering almost everything from data and consent management to digital identity services. One actor may have different roles and offerings. In addition to identifying the respondents, the empirical research revealed many other actors in the MyData based ecosystem, such as an individual, third parties, fourth parties and personal data providers or so called "attribute providers", meaning data sources.

In human-centered personal data management, an individual is seen as a controller of his/her own data. He/she has the control over how the data is used by companies and add value in the value creating process by actively bundling own datasets together. However, according to our empirical data, having lots of data in one place is not enough but the value comes from the benefits that an individual experiences as a positive side effect of having control over own data and being able to bundle it. Therefore, individuals probably won't value owning or controlling their own data per se, but the value is in using the data for own purposes to get personalized services based on own data.

Service providers refer to app developers that provide applications for individuals on the platform or to companies that use individual's data to provide them with personalized services. Service providers offer value-adding and personalized services for individuals based on their data and interact with individuals and other organizations in the ecosystem via a platform. The interaction among the actors is based on trust and value co-creation, meaning that when an individual shares his/her data via the platform, he/she gets personalized service and on the other hand, the service provider will get to know better with the customer based on the validated and accurate data provided. In addition to service providers, individuals may share their data with research organizations and contribute to research they choose in a secure way.

> *"The value is in the aggregation of diverse datasets (genome, medical, fitness, nutrition etc) from thousands people. This value can only be unleashed for medical research, better treatment and prevention when citizens are empowered to control access to their own data."* (Company 2)

Policy developers and technology providers support the emerging ecosystem, a "trust framework" by providing operators and other actors with policies and standards or support with technology. These organizations are facilitators that connect actors and spread the knowhow about the new emerging MyData based ecosystem and new business opportunities.

Platform operator's roles

Our study suggests four roles for platform operators: *an agent, a facilitator, a data aggregator* and *a trust framework creator*. *An agent* is a blinding filter between the individual and the service provider and *provides both of the parties with accurate information and data based recommendations* so that they can better trust each other and co-create value.

From an individual's point of view, using an agent creates greater value comparing to the situation that an individual would interact with a service provider without the agent. The role can be adopted by already established commercial companies like retail banks or telecom operators or start-up companies that fill the need of an individual to get more personalized service from service providers.

> *"Vendors (companies) and customers (individuals) will finance each their chosen agents in the upcoming 4-corner market. We do not necessarily see vendors "pay for information" but rather to lower the price offered to a potential customer based on an assessment of the profitability of the sale/transaction." (Company 11)*

A facilitator connects individuals and organizations by *facilitating interaction* like data transaction between companies and individuals who want to share their data for the use of research or in order to get personalized services from companies. Researchers and companies may ask for data and tell about the possible rewards on the platform. An operator will get revenue streams from the organization asking for data.

> *"[The company] will connect organizations seeking data for commercial or academic research, with users who consent to share their data for research in exchange for compensation or gratis. (...) [The company] receives a transaction fee from the researcher for facilitating the above mentioned interaction as well as handling the transfer of the benefit." (Company 1)*

Data aggregator can be understood in two ways; as an organization that collects individuals' data without their consent and uses it for own purposes or as one role of an operator that enables individuals to control their data. In the MyData ecosystem, a data aggregator provides individuals with a highly secured platform, where individuals can hold their data from health information to academic records thus, providing individuals with a data store. From an operator point of view, when data is aggregated from lots of people, with their own consent, the value that all of the datasets provide together is huge. Value is returned to the individuals and used in improving individual's own wellbeing and health, not operator's profit making.

> *"[The company] aggregates all a user's data (social, financial, health, purchases, positional and more) into a single LOCAL library under the users direct control and ownership on their device(s) and personal cloud of their choice – hence their library is 100% private to them." (Company 4)*

Trust Framework creators, also known as scheme authorities or ecosystem providers (mostly non-profit organizations) are building so-called trust frameworks, thus foundation for other actors in the ecosystem to operate in a human-centered way in personal data management. A trust framework that is maintained by the operator enables individuals to take control over their own data and enables commercial or non-commercial service providers in the ecosystem to adopt the MyData model. Individuals may access their data via the trust framework on the servers of trusted, participating organizations that are licensed by the operator. Therefore, in this case, a platform is the trust framework.

> *"(...) In order to have the maximum impact and enable the most widespread and accelerated growth of personal attribute sharing, such a body would need to be seen to be independent of any one commercial organisation, or sector." (Organization 22)*

Trust framework creator is different to a facilitator in a way that it tries to create a framework and an ecosystem, not a single platform, at least in principle. Data transactions are therefore done within the framework, not via a platform provided by a single organization. In a trust framework, data remains stored on the servers of the other companies and a trust framework creator is the one who connects individuals and organizations on the framework and creates rules and regulations of how to operate.

> *"Individuals can access their data which are stored (and remain stored) on the servers of participating organisations which have been licensed by the [company] (in its role as Scheme Authority) to connect to the Trust Framework, a new trust layer on the internet." (Organization 6)*

CONCLUSIONS

The existing literature has discussed about platforms as value enablers (c.f. e.g. Lusch & Nambisan 2015, Breidbach et al. 2014), as well as identified different roles and actors in an ecosystem (c.f. Nyström et al. 2014, Eloranta & Turunen 2015) but no such previous research was found in the context of MyData. This study contributes to the discussion on networked business models, which emphasizes the different actors, their roles and value exchanges among the actors (c.f Komulainen et al. 2006, Timmers 1998). According to Palo (2014), taking a network perspective to business models helps identifying actors' roles and activities as well as their relationships with each other. Our study brings greater detail to this discussion by illustrating what does the MyData based service ecosystem look like from a platform operator's perspective, who are the other connected actors and what roles does the operator have in the ecosystem. We identified four different roles for a platform operator and named many other key actors in the ecosystem. We will present the central findings and the contribution to previous research in the following sections.

Roles in the service ecosystem

Our study revealed four different roles for a platform operator. An operator can be an agent, a trust framework creator, a facilitator and/or a data aggregator. In previous studies, platform operators are described as mediators that bring together two or more interdependent groups of actors (Osterwalder & Pigneur 2010, p. 78–79, Muzellec et. al 2015) by facilitating data transactions and other interactions among the network of actors (Iansiti & Levien 2004, Bakos & Katsamakas 2008, Osterwalder & Pigneur 2010, p. 77). Our study reveals that in the context of MyData, a platform operator not only support actors in exchanging resources but it enables value co-creation among individuals and other actors in the ecosystem in four different ways as follows: 1) being a representative for individuals and service providers and/or 2) building a trust-based network for actors, and/or 3) facilitating interaction and/or 4) offering a personal data store.

Agent: a representative for individuals and service providers

First, a platform operator as an agent is a blinding filter between an individual and service provider. It provides both of the parties with accurate information and enable value co-creation among the actors: an individual will get better service, and a service provider will get accurate data from the individual to which it can base on an offer, for example an insurance. A role of a coordinator in previous network study in the context of innovation networks (Nyström et al. 2014) have similar features to an agent. Nyström et al. define a coordinator as a "focal network hub" that coordinates participants in a network and acts as a representative of a certain group of actors, collecting information for example about the user needs and desires and then forwards the collected information to other actors in the ecosystem. However, in MyData based ecosystem, the control over data is on individual, meaning that the agent can only share individual's information with other actors in the ecosystem with the informed consent of an individual. In the context of e-business, "online shopping agents" look for the best deals of an item searched by an individual on the internet, report about the deal to the customer and allow easy comparison (Weill and Vitale (2001, p. 170–171). In the traditional model, the agent comes to the individual, but in MyData based ecosystem the agent is chosen by the individual or the service provider, because of the value it enables. The recommendation of the agent is based on data shared by the individual instead of sites a person has visited online, making the interaction efficient and the deal as personalized as possible.

Trust framework creator: building a trust based network

Second, in a role of a trust framework creator, a platform operator does not only offer a platform but tries to create a sustainable and collaborative network. A trust framework creator wants to change the data management ecosystem to be more human-centered and it convinces other actors to join. A trust framework creator enables value co-creation among the actors by building and providing other actors with a foundation, a framework and rules to interact. Individuals may access their data via the trust framework on the servers of trusted, participating organizations that are licensed by the operator via a 'trust layer' or in other words, a platform. In previous research about human-centered personal data from privacy perspective, Spiekermann and Novotny (2015) have identified a "consent agent", a privacy enabler between an individual and a service provider that offers a user-friendly way of giving consent and setting standards. Other scholars have also suggested different roles that an organization can take in an ecosystem in different contexts. An actor may try to change the environment and influence in creating new relationships (Heikkinen et al. 2007), try to convince the potential actors to join the network (Heikkinen & Tähtinen 2006), connect organizations together and form an operating network (Snow et al. 1992), establish close relationships between actors, such as users and companies or orchestrates the whole ecosystem (Nyström et al. 2014). A trust framework creator can be seen as a collection of the roles described in the context of MyData. Our findings suggest that offering consent management is the key activity of a platform operator. However, in addition to enabling individuals to give consent on sharing data from a data source to a service provider a trust framework creator tries to build a trust-based ecosystem.

Facilitator: facilitating interaction

Third, a facilitator facilitates interaction among the actors. In the MyData based ecosystem, an individual has control over his/her own personal data. This is why a platform operator can't be the gatekeeper as it is seen traditionally. For example Allen (1970) define a gatekeeper as an organization that *starts* information and communication exchange, networking, gathering information from different sources and spreading the information. In MyData model, data flows from a data source to a service provider via a platform only with the consent of an individual. A platform operator as a facilitator *enables* information and communication exchange, gathering information from different sources and spreading the information to the whole ecosystem, but not start it. An individual can interact with different organizations and companies via the platform, share data, receive benefits, get personalized service based on his/her own data, network and gather data from different sources and share it to the whole ecosystem. Our findings support the previous case study on platforms in service-driven manufacturing context (c.f. Eloranta & Turunen 2015) in the sense that platform operators provide opportunities for new value offerings and facilitate interaction among the actors and thus enables them to build trust between each other.

Data aggregator: offering a personal data store

The fourth of the roles identified is a data aggregator, which means integrating individuals' personal data from different sources into one single data store so that the individuals can use the data in one secure place rather than having the datasets in multiple locations. A data aggregator provides individuals with a highly secured personal data store on the platform, where individuals can hold their data from health information to academic records. In e-business, data aggregators are seen as active intermediaries that collect and analyze information from multiple sources (Weill & Vitale 2001, p. 164). In the MyData model, the data is aggregated on behalf of an individual from the sources he/she wants for the use and own purposes of the individual, not other companies in the ecosystem. Once the data is collected into one place, an individual can use it as he or she wants. For example, an individual may allow the platform operator or a service provider to compare and combine the personal data or parts of it in order to make better sense of the data, for example about the individual's health, use of money or habits. The aggregated data is not sold to companies e.g. advertisers like in traditional models (Weill & Vitale 2001, p. 175), but the value is co-created between an individual and the company that requests the data. The data store is basically a service on top of a platform that is not mandatory for data transactions but it enables individuals to have the data in one place and make sense of it.

Actors in the service ecosystem

Our study reveals that in addition to the actors identified in the literature on two-sided and personal data markets: the platform operators, individuals and service providers (c.f. Beyeler et al. 2012, p. 316, Muzellec et al. 2015, Spiekermann & Novotny 2015) the MyData based ecosystem consists of and is supported by other actors as well, namely the research organizations, public organizations, consultancies, policy developers and technology providers. In the context of MyData, personal data providers or so-called "attribute providers" were also identified, which are companies that hold data about the individuals, provide individuals with their own personal data and share the data with other organizations only with consent of an individual and for individuals' own purposes.

In this study, platform operator's business model was seen as a framework consisting actors, roles and value exchanges or interactions in the ecosystem. More specific, actors are seen as active value co-creators, not just as producers or consumers of value (Vargo & Lusch 2011, Lusch & Nambisan 2015). Koivumäki et al. (2015) have identified different actors in MyData based market, some of which were similar to this study. The actors identified in this study are also similar to the findings of Pawar et al. (2008) in context of mobile virtual communities. They name three primary types of actors: customers, providers and a community platform operator, which provides an infrastructure and means for the interaction between the consumers and service providers. In the ecosystem of this study, where value is created by multiple actors as a co-creation (Prahalad & Ramaswamy 2004, Chandler & Vargo 2011), an individual, a platform operator and a service provider are the key actors. However, there are also many other actors in the ecosystem that are needed, for example policy developers, that set common rules for actors interacting with each other in the emerging and developing MyData based ecosystem.

Also, it is good to notice that MyData is a new model (Poikola et al. 2014) and therefore no settled roles exist in the ecosystem yet. In this research, a platform operator is considered as collection of different roles (c.f. Montgomery 1998) that can be identified by describing the intentions and preferences of changing the ecosystem by acting in a specific role (see Anderson et al. 1998). In this case, the intention is to give control over data to individuals and offer MyData based services in the ecosystem. We found that operators may take different roles in the ecosystem, which supports previous research (c.f. Spiekermann & Novotny 2015, Möller, Rajala & Svahn 2005). Also in line with Poikola et al. (2014), this study suggests that an operator can either charge individuals for the service, act as a distribution channel for applications, aggregate data on behalf of an individual or offer added value services as a main primary service provider in the service ecosystem.

In platform operator's ecosystem, an operator provides stakeholders with an infrastructure, meaning a platform, to build relationships, facilitate data and enable service providers to offer their services to individuals in a secure way. These findings support those of Pawar et al. (2008), who argue that in the context of mobile virtual communities, an operator may provide customers and service providers with an infrastructure to facilitate content and allow service providers to show their services to customers on the platform.

Our findings form a bridge between the discussions of networked business models and human-centered personal data management and gives practical examples of the roles that a platform operator may take in the MyData based ecosystem. Our study also identifies several other actors in the ecosystem and making the first illustrations of what the ecosystem would look like and what interactions and value co-creation activities there are when individuals are provided with a way to control their own data and share it with other companies, store it and use it for own purposes.

MANAGERIAL IMPLICATIONS

Managers in companies similar to a platform operator may use the presented illustration of a platform operator's service ecosystem as a framework when trying to understand the ecosystem as a whole and what different roles they could take in the ecosystem. The framework illustrates possible business models from platform operators for managers. In a

traditional personal data based ecosystem where data is owned by organizations, not all of the possible combinations of business models are suitable. Some business model combinations in one firm may even be in conflict and require careful handling during implementation. (Weill & Vitale 2001, p. 302–304.) When adopting a MyData enabled business model in personal data management, transparency is in very important but most the important thing is that an individual is in control over his/her own data.

LIMITATIONS AND FUTURE RESEARCH AVENUES

While providing new knowledge about platform operator's business models in the context of MyData, our research also has limitations, which at the same time open up new avenues for future research. First, our research is based on one case study and on questionnaire data only. Even if the questionnaire data were rich, representing the case and answering to our research questions, for example interviewing the companies in the ecosystem would give a broader understanding about the interactions, roles and actors in the ecosystem. Second, MyData based ecosystem is constantly changing and maturing, and therefore the roles will change and new roles and actors may emerge. Companies and organizations that are now developing services based on MyData are just starting their business and it may have affected to their answers. This research provides a snapshot of the ecosystem today but any research concerning business models in the future in the context of human-centered personal data management would add great value to the discussion.

ACKNOWLEDGEMENTS

REFERENCES

Allen, T.J. (1970). Communication networks in R&D laboratories. *R&D Management*, 1(1), 14–21.

Alt, R., Militzer-Horstmann, C. & Zimmermann, H.-D. (2015). Editorial 25/2: Electronic Markets and privacy. *Electronic Markets*, 25, 87–90.

Anderson, H., Havila, V., Andersen, P. & Halinen, A. (1998). Position and role. Conceptualizing dynamics in business networks. *Scandinavian Journal of Management*, 14(3), 167−186.

Bakos, Y. & Katsamakas, E. (2008). Design and ownership of two-sided networks: Implications for internet platforms. *Journal of Management Information Systems*, 25(2), 171–202.

Bandara, W., Gable, G.G. & Rosemann, M. (2005). Factors and measures of business process modelling: model building through a multiple case study. European Journal of Information Systems, 14(4), 347 -360.

Baudendistel, I., Winkler, E., Kamradt, M., Brophy, S., Längst, G., Eckrich, F., Heinze, O., Bergh, B., Szecsenyi, J. & Ose, D. (2015). The patients' active role in managing a personal electronic health record: a qualitative analysis. Supportive Care in Cancer, 23(9), 2613–2621.

Beyeler, W. E., Kelic, A., Finley, P. D., Aamir, M., Outkin, A., Conrad, S., Mitchell M. D. & Vargas, V. (2012). In: Yang, S. J., Greenberg, A. M. & Endsley, M. (eds.) *Social Computing, Behavioral-Cultural Modeling and Prediction.* Conference Paper. Berlin: Springer Berlin Heidelberg: 314-321.

Breidbach, C., Brodie, R. & Hollebeek, L. (2014). Beyond virtuality: from engagement platforms to engagement ecosystems. *Managing Service Quality,* 24(6), 592–611.

Carrington, P.J., Scott, J. & Wasserman, S. (2005) Models and Methods in Social Network Analysis. Cambridge, MA: Cambridge University Press.

Chandler, J. D. & Vargo, S. L. (2011). Contextualization and Value-in-Context: How Context Frames Exchange. *Marketing Theory,* 11(1), 35–49.

Choi, J.P. (2010). Tying in two-sided markets with multi-homing. *Journal of Industrial Economics*, 58(3), 607-626.

Dubois, A. & Gadde L.-E. (2002). Systematic combining: an abductive approach to case research, *Journal of Business Research,* 55, 553–560.

Dubois, A. & Gibbert, M. (2010). From complexity to transparency: managing the interplay between theory, method and empirical phenomena in IMM case studies. *Industrial Marketing Management*, 39, 129-136.

Eichelberg, M., Aden, T., Riesmeier, J., Dogac, A. & Laleci, G.B. (2005). A survey and analysis of electronic healthcare record standards. *ACM Computing Surveys*, 37(4), 277–315.

Eloranta, V. & Turunen, T. (2015). Platforms in service-driven manufacturing: Leveraging complexity by connecting, sharing, and integrating, *Industrial Marketing Management*, article in press.

Enders, A., Hungenberg, H., Denker, H-P. & Mauch, S. (2008). The long tail of social networking. Revenue models of social networking sites. *European Management Journal*, 26, 199– 211.

Feijóo, C., Luis Gómes-Barroso, J. & Voigt, P. (2014). *International Journal of Information Management,* 34, 248–256.

Frankenberger, K., Weiblen, T. & Gassmann, O. (2013). Network configuration, customer centricity, and performance of open business models: A solution provider perspective. *Industrial Marketing Management,* 42(5), 671–682.

Frow, P., McColl-Kennedy, J. R. & Payne, A. (2016). Co-creation practices: Their role in shaping a health care ecosystem. *Industrial Marketing Management*, article in press.

Frow, P. & Payne, A. (2011). A stakeholder perspective of the value proposition concept. *European Journal of Marketing*, 45(1/2), 223–240.

Gnesi, S., Matteucci, I., Moiso, C., Mori, P., Petrocchi, M. & Vescovi, M. (2014). My Data, Your Data, Our Data: Managing Privacy Preferences in Multiple Subjects Personal Data. *Lecture Notes in Computer Science*. 8450, 154-171.

Grönroos, C. & Helle, P. (2012). Return on relationships: conceptual understanding and measurement of mutual gains from relational business engagements. *Journal of Business & Industrial Marketing,* 27(5), 344–359.

Heikkinen, M.T., Mainela, T., Still, J. & Tähtinen, J. (2007). Roles for managing in mobile service development nets. *Industrial Marketing Management,* 36(7), 909–925.

Heikkinen, M. T. & Tähtinen, J. (2006). Managed formation process of a R&D network. *International Journal of Innovation Management*, 10(3), 271−298.

Hunt, S. & Morgan, R. (1995). The Comparative Advantage Theory of Competition. *Journal of Marketing*, 59(4): 1–15.

Iansiti, M. & Levien, R. (2004). Strategy as ecology. *Harvard Business Review*, 82(3), 68–78.

Katell, M. A., Mishra, S. R. & Scaff, L. (2016). A Fair Exchange Exploring How Online Privacy is Valued. *49th Hawaii International Conference on System Sciences*. 1881-1891. DOI 10.1109/HICSS.2016.239

Koivumäki, T., Pekkarinen, S., Saraniemi, S., Heikka, E.-L. & Lappi M. (2015). MyData − Value analysis and results of DHR.

Komulainen, H., Mainela, T., Sinisalo, J., Tähtinen, J. & Ulkuniemi, P. (2006). Business model scenarios in mobile advertising. *International Journal of Internet Marketing and Advertising,* 3(3), 254.

Knight, L. & Harland, C. (2005). Managing supply networks: organizational roles in network management. *European Management Journal*, 23(3), 281−292.

Lee, R. M. & Fielding, N. G. (2009). In: Hardy, M. & Bryman, A. (eds.) *The handbook of data analysis*. London: Sage.

Lusch, R.F. & Nambisan, S. (2015). Service Innovation: A Service-Dominant logic perspective. *MIS Quarterly,* 39(1), 155–175.

Lusch, R., Vargo, S. & Tanniru, M. (2010). Service, Value Networks and Learning, *Journal of the Academy of Marketing Science*, 38(1): 19–31.

Magretta, J. (2002). Why Business Models Matter. *Harvard Business Review,* 80(5), 86–92.

Mandl, K.D, Simons, W.W, Crawford, W.C.R, Abbett, J.M. (2007). Indivo: a personally controlled health record for health information exchange and communication. BMC Medical Informatics and Decision Making, 7(1), 25.

Mettler, T. & Eurich, M. (2012). A ”design-pattern”-based approach for analyzing e-health business models. *Health Policy and Technology*, 1(2), 77 –85.

Montgomery, J.D. (1998). Toward a role-theoretic conception of embeddedness. *American Journal of Sociology*, 104(1), 92−125.

Muzellec, L., Ronteau, S. & Lambkin, M. (2015). Two-sided Internet platforms: A business model lifecycle perspective. *Industrial Marketing Management,* 45(2), 139–150.

Möller, K., Rajala A. & Svahn S. (2005). Strategic business nets—their type and management. *Journal of Business Research,* 58(9), 1274-1284.

Möller, K. & Svahn S. (2009). How to influence the birth of new business fields — Network perspective. *Industrial Marketing Management*, 38(4), 450-458.

Nyström, A-G., Leminen, S., Westerlund, M. & Kortelainen, M. (2014). Actor roles and role patterns influencing innovation in living labs. *Industrial Marketing Management*, 43(3), 483–495.

Osterwalder, A., & Pigneur, Y. (2005). Clarifying business models: Origins, present, and future of the concept. Communications of the AIS, 16, 1−25.

Osterwalder A. & Pigneur, Y. (2010). Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers. Canada: John Wiley & Sons.

Palo, T. (2014). Business Model Captured? Variation in the use of business models. Oulu Business School. Dissertation. University of Oulu, Oulu.

Palo, T. & Tähtinen, J. (2011). A network perspective on business models. *Journal of Business & Industrial Marketing*, 26(5), 377-388.

Papadopoulou, E., Stobart, A., Taylor N.K. & Williams, M.H. (2015). Enabling data subjects to remain data owners. *Smart Innovation, Systems and Technologies*, 38, 239-248.

Pawar, P., Subercaze, J., Maret, P., Van Beijnum B.-J. & Konstantas, D. (2008). Towards business model and technical platform for the service oriented context-aware mobile virtual communities. *Computers and Communications*, 6-9(7), 103–110.

Prahalad, C.K & Ramaswamy, V. (2004). Co-creation Experiences: The Next Practice in Value Creation. *Journal of Interactive Marketing,* 18(3), 5–14.

Piekkari, R., Plakoyiannaki, E. & Welch, C. (2010). 'Good' case research in industrial marketing: insights from research practice. *Industrial Marketing Management,* 39, 109-117.

Poikola, A., Kuikkaniemi K., & Kuittinen. S. (2014). My Data - Johdatus ihmiskeskeiseen henkilötiedon hyödyntämiseen. Ministry of Transport and Communications. White paper. http://urn.fi/URN:ISBN:978-952-243-418-0.

Poikola, Kuikkaniemi, Honko (2015). MyData – A Nordic Model for human-centered personal data management and processing. Ministry of Transport and Communications. White paper. http://urn.fi/URN:ISBN:978-952-243-455-5.

Rochet, J.-C. & Tirole, J. (2003). Platform competition in two-sided markets. *Journal of the European Economic Association*, 1(4), 990–1029.

Rindfleisch, A. & Moorman, C. (2001). The Acquisition and Utilization of Information in New Product Alliances: A Strength-of-Ties Perspective. *Journal of Marketing,* 65(4), 1–18.

Runeson, P. & Höst, M. (2009). Guidelines for conducting and reporting case study research in software engineering. *Empirical Software Engineering*, 14, 131–164.

Spiekermann, S. & Novotny, A. (2015). A vision for global privacy bridges: Technical and legal measures for international data markets. Computer Law & Security Review, 31(2), 181-200.

Snow, C.C., Miles, R. E. & Coleman, H. J., Jr. (1992). Managing 21st century network organizations. *Organizational Dynamics*, 20(3), 5−20.

Tan, B., Pan, S. L., Xianghua, L. & Lihua, H. (2015). The Role of IS Capabilities in the Development of Multi-Sided Platforms: The Digital Ecosystem Strategy of Alibaba.com. *Journal Of the Association for Information Systems*, 16(4), 248–280.

Timmers, P. (1998). Business Models for Electronic Markets. Electronic Markets, 8(2), 3–8.

Uhrich, S. (2014). Exploring customer-to-customer value co-creation platforms and practices in team sports, *European Sport Management Quarterly*, 14(1), 25-49.

Vargo, S. L. & Lusch, R. F. (2011). It's All B2B...and Beyond: Toward a Systems Perspective of the Market, *Industrial Marketing Management*, 40, 181–187.

Weber, R. H. (2015). The digital future - A challenge for privacy? *Computer Law & Security Review* 31, 234-242.

Weill, P., & Vitale, M. R. (2001). Place to space. Boston: Harvard Business School Press.

Wirtz, B. W., Pistoia, A., Ullrich, S. & Göttel, V. (2015). Business models: Origin, Development and Future Research Perspectives. *Long Range Planning*, 1–19.

Yin, R. K. (1981). The case study crisis: some answers. *Administrative Science Quarterly*, 26(1), 58-65.

Zhang, N., Levä, T. & Hämmäinen H. (2014). Value networks and two-sided markets of Internet content delivery. *Telecommunications Policy,* 38(5/6), 460–472.