Co-creation of Innovative Digital Services

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Abstract. In the context of digital innovation, this paper discusses co-creation of digital services with the help of translation processes described in the Actor-Network Theory (ANT). While using the translation processes such as problematization, interessement and enrolment, the paper delineates how different stakeholders can be involved in the co-creation of innovative digital services. Thus the paper makes a contribution by presenting the co-creation of digital services in the perspective of translation processes of ANT by showing how different actors can be involved in co-creation of digital services. 'Establishing trust on digital innovation' and 'prioritization during digital innovation' are identified as influential issues for the involvement of actors during digital innovation. In that way, the paper also makes contribution to the emerging literature on digital innovation.

Key Words: Digital Services, Co-creation, Problematization, Interessement, Enrolment.

1 Introduction

Digitalization has transformed previously non-digital services such as books, music, maps, camera, and calendar into digital services (Yoo et al. 2010). The services provided by iPhone (e.g. iTunes) are prime examples of digitalization. Google maps and digital calendar are another set of examples of digitalization. In case of iPhone, we know that they are giving consumers the opportunity to make/add their favorite apps to their phones (Zwass, 2010). This can be referred to as an attempt by Apple to co-create services with their consumers as "co-creation refers to allowing the customer to co-construct the service experience to suit his/her context" (Prahalad and Ramaswamy, 2004, p. 8). Although co-creation has been discussed in the context of new service or product development (Alam and Perry, 2002; Alam, 2002; Prahalad and Ramaswamy, 2004; Karhu et al., 2011), very little attention has been drawn in investigating the issue of digital service co-creation. Due to the growing instances of digitalization, it can be argued that it is required to study the aspect of co-creation of digital services.

Though user involvement has been discussed in case of software developments (Beck et al. 2001), digital services that we are referring here are obtained through digitalization of existing products or services and hence are different from traditional software because digital services have ubiquitous nature. They are integrated with everyday objects (e.g., GPS in a car). So, digital services cannot have the same user-centered approach like the software design. It can be argued that as the digital services come with digital artifacts and used in everyday scenario, the co-creation approach will be different.
The different nature of digital services, i.e., combination of digital artifact and services will make the co-creation activities different from software development. Moreover, digital services do differ from the characteristics of the services that are mentioned in the service marketing literature. Services are described as intangible, heterogeneous, inseparable and perishable (Zeithaml et al. 1985). But digital services such as music services in mp3 format are not perishable rather they can be stored in digital

format. So, it can be argued that the nature of digital services, i.e., combination of digital artifact and service will provide different challenges during co-creation of those services.

The co-creation of services and products has been discussed in recent literature (Karhu et al., 2011; Alam and Perry, 2002; Alam, 2002; Prahalad and Ramaswamy, 2004). If we look at the existing literature that discuss co-creation of services and products (Alam and Perry, 2002; Alam, 2002; Prahalad and Ramaswamy, 2004), they do not consider the aspect of services that have combined nature, i.e, product-service combination as in the case of digital services. Karhu et al. (2011) discuss the co-creation of digital services and applications but it discusses the Web 2.0 digital ecosystem where companies can co-create business with their users, for example, Apple appstore is being used as a co-creation ecosystem. So, digital service co-creation is not discussed. But it is an issue that is required to be investigated because human life is getting more and more influenced by the digitalization of existing products and services. E-books or E-journals are replacing traditional books and journals, people are depending more on digital maps, hardly any people now use old fashioned film camera rather they use digital camera. In B2B setting, smartphone apps developers are constantly dealing with smartphone producers to provide digital services such as music, calendar etc. But very little attention has been given to study the co-creation issue of the digital services.

The current study focuses on co-creation of digital services in the context of digital innovation of vehicle maintenance. These digital services are embedded with manufacturing product and have B2B setting. But like other digital services, these services also based on digital technology. Following the layered architecture of digital technology (Yoo et al., 2010), it can be said that due to the re-programmability characteristic, service layer provides the opportunity to the users to create, manipulate, store different services and thus giving the users the opportunity to co-create. And also the technology developers design and plan for the device and network layer and they play role in the co-creation because the developers play the role of central actors in co-creation. Looking at this aspect and the lack of understanding of co-creation of digital services, it will be interesting to investigate the following research question: *How can different stakeholders be involved in co-creating digital services in the context of digital innovation?*

The next section of this paper provides a literature review on co-creation of services and products, then we present the theoretical lens which is the translation processes of Actor-Network Theory (ANT). Then we discuss our methodology. Later we have presented our results on co-creation of digital services by applying the theoretical lens. The paper ends with a discussion of the results and concluding remarks.

2 Related Literature

Co-creation refers to collaboration with customers for the purposes of innovation and has become a foundational premise of the service-dominant logic (Lusch et al., 2007). Co-creation is different from the notion of customization (Prahalad and Ramaswamy, 2004). The difference between "co-creation" and "customization" lies in the degree of involvement of the customer; in general terms, the customer plays a less active role in customization than in co-creation (Kristensson et al. 2008). In customization, the customer's role is usually restricted to the end of the innovation phase and involves making suggestions for incremental changes to an almost complete prototype (i.e. at the end of the innovation process). In this case, the customer is usually cast in the reactive role of responding to questions being posed by the manufacturer (Kristensson et al. 2008). In contrast, co-creation refers to the involvement of the customer as an active collaborator right from the beginning of the innovation process. In the process, the customer may suggest innovative ideas for the company's forthcoming products (Kristensson

et al. 2008). Digital service co-creation is also focusing on the idea that the customers will play an active collaborator from the beginning of the innovation activities.

Consumer co-creation is vital in new product development (Hoyer et al., 2010). Hoyer et al (2010) show a cocreation framework for consumer co-creation that discuss degree of co-creation which includes both the scope and intensity of co-creation. Three sets of antecedents of the degree of co-creation have been described: consumer-level motivators, firm-level impediments and firm level stimulators. Impediments include concerns about secrecy, ownership of intellectual property rights, information overload and production feasibility (Hoyer et al., 2010). Digital service co-creation might also have some impediments that need to be investigated.

As the characteristics between services and tangible products are different, new service development is different from a tangible product development (Alam, 2002). In the context of business-to-business service development, the purpose of involving users is: superior and differentiated services, reduced cycle time, user education, rapid diffusion, improved public relations, long-term relationships (Alam, 2002). These purposes or objectives of user involvement are discussed with respect to services that are not tangible. However, digital services rendered via tangible product, i.e., a digital device. So, it can be argued that the objectives of user involvement or co-creation with the customers will not be the same.

While describing innovation in mobile phone services, seven key strategies for successful customer involvement are discussed (Kristensson et al., 2008). The strategies are: knowledge should be generated from user situation, knowledge is derived from a variety of user roles, co-creation is more likely to be realized if users are provided with analytical tools before being involved in the co-creation exercise, user involvement in NPD is more likely to be successful if users are intrinsically motivated by an apparent personal benefit, user involvement in NPD is more likely to be successful if users are not involved in brainstorming exercises isolated from their (the users') everyday contexts, limited expertise is not a barrier to creative thinking when users are involved in NPD, heterogeneous users require heterogeneous solutions, which is why a wide array of users should be invited to participate in a user involvement project (Kristensson et al., 2008).

All these studies describe co-creation from manufacturing product or conventional service or consumer digital product (mobile phone) perspectives. The digital services that are focus of our discussion are product-service combination with digital technology embedded in it and they are not typical consumer product. These characteristics of the services emphasizes a different study on their co-creation.

3 Theoretical Lens

The concept of 'Translation' from 'Actor Network theory (ANT)' has been chosen as a theoretical lens for this study. Translation consists of processes such as, problematization, interessement, enrolment and mobilization. The reason behind choosing this as theoretical lens is that ANT helps to understand how actor-networks are formed (Rodon et al., 2008) and how the translation takes place (Callon, 1986) as in our study we are aiming to understand how different actors can be involved to co-create digital services. The process of translation has four moments:problematization, 'interessement', enrolment, and mobilization (Callon, 1986).

During problematization, an actor frames a problem or an opportunity and attempts to persuade other actors in the network that the problem/opportunity is worth dedicating resources to its solution (Rodon et al, 2008). It is crucial to find a solution that is of common interest for the participating actors, despite their diverse interests. Problematization culminates with the definition of the obligatory passage point, a point where any actor with a stake in the network has to pass through to attain its objectives (Rodon et al., 2008).

Interessement means that other actors become interested in the solution proposed. They change their affiliation to a certain group in favour of the new actory attempts to interrupt all potential competing associations and to construct a system of alliances (Rodon et al, 2008; Callon, 1986). If interessement is successful, it confirms the validity of problematization (Rodon et al, 2008).

Enrolment concerns the group of multilateral negotiations, trials of strength and tricks that accompany the interessements and enable them to succeed (Rodon et al, 2008; Callon, 1986). There are five strategies for enrolment: (1) cater to others' interests; (2) convince others that their usual ways are cut off; (3) to seduce them through a detour; (4) reshuffle interests and goals (displacing goals, inventing new groups or new goals,rendering the detour invisible, winning trials of attribution); and (5) become indispensable to others (Latour, 1987, cited in Rodon et al., 2008).

Mobilization is about stabilizing the actor network by making durable and irreversible relations. Then the network results in a single actor which can be treated as a black-box (Latour, 1987, cited in Rodon et al., 2008).

Our study explains the first three processes of translation in the co-creation of digital services. This is a result from an on-going research and we have not yet reached at the mobilization stage.

4   Research Methodology

We have conducted case study in this research. Yin (2003, p. 3) suggested that case studies can be exploratory, descriptive or explanatory. This research follows an exploratory case study methodology. As the aim of the paper is to get insights into the phenomenon of digital innovation of services and understand the problems related to it, we have found exploratory case study will be suitable for this research.

4.1   Research Context and Case Description

This paper reports from an on-going project initiated by a vehicle manufacturing company regarding digitalization of vehicle maintenance services. In the automotive industry, today most of the maintenance services are done by following a preventive way of maintenance. In this style of maintenance, a vehicle owner signs a contract with the maintenance service provider and the vehicle is brought to the service provider on a scheduled basis, for example, once in six months or a year. It means that the owner needs to bring the vehicles for maintenance irrespective of any problem occurs. This sometimes results in unnecessary change of parts and other maintenance which costs money. The biggest worry is that the current maintenance system cannot stop any unexpected breakdown. To remedy the problem, the technology development department of a vehicle manufacturing company is developing a digital technology called 'Remote Diagnostics Systems' that will be able to monitor the vehicle and

predict any possible fault and diagnose the fault well in advance. This will allow the vehicle owner not to bring the vehicles for maintenance service on a scheduled basis and it will nullify the possibility of unexpected breakdown of the vehicles in the middle of a road as the faults will be predicted well in advance before they happen. This technology is not just about proving one type of service such as diagnosing engine fault. It will open the door for developing many digital services related to the vehicle maintenance and those are yet to be identified and those will pave the way to create an intelligent vehicle.

This case is suitable because it has created the possibility of exploring the issue of digital innovation of services. For successful innovation, it is required to have an in-depth knowledge of the current problems in vehicle operation and maintenance so that the emerging technology can solve the problems. The technology developers do not have thorough understanding about customers' experience with their vehicles, how they operate and maintain their vehicles. It is also essential to know what the customers think about the 'Remote Diagnostics Technology' and what they expect from the technology. All these aspects are the driving forces for choosing this case.

4.2 Data Collection and Analysis Strategy

To serve the purpose, several activities have been performed in order to generate data by involving different stakeholders. The activities include interviews, workshops, project meetings and observations and e-mail correspondences. Following paragraphs show the details about the activities:

The exploratory study started with the service development meeting with the purpose to plan, find and create refined project document. Each of the meeting lasted between 1-2 hours and they served as the basis for preparing workshops. Meeting notes and summary documents provided the participants' expectations and are coupled with other documents.

In addition to initial planning meetings and interviews, monthly meetings (each of which was 3 hours in length) were held. These were generic in nature and discussed project issues which occurred across the disciplines such as technical, service development and business. Cross-disciplinary inputs about opportunities and challenges were collected using notes and meeting minutes.

Even though, the interviews are rich sources of data, they should be supplemented with other sources (Klein and Myers, 1999). The initial development meetings were followed by conducting semi-structured and open ended interviews with the purpose to get rich information. The interview study was inspired by the work of (Myers and Newman, 2007; Schultze and Avital, 2011) and supplemented them with number of activities listed above.

Three workshops were conducted as half-day activities and they included discussion and drawing of value networks with the business area representatives. The purpose of these activities was to understand the existing structure and character of the value networks from customers' perspective. The main focal point about exploring opportunities and challenges were considered during this activity. Nine Interviews were taken from different stakeholders. The interviews were audio recorded and later transcribed to interpret data. These were one of the major sources of information where value networks were drawn with the particular business areas representatives to find out existing status and potentials of remote diagnostics systems. Twenty-six service development meetings, eight monthly meetings and available

documents provided the basis to run these workshops. These available documents include weekly reports about project, field notes, and company documents. This triangulation of multiple sources of data is one approach for data validation (Yin, 2003).

Table 1 below summarizes the data collection activities and participants, with their numbers, involved.

Activities	Number of Participants
Interviews	• Business Area Representatives (3) • Maintenance Manager (1) • Traffic Managers of bus operating company (2) • Service mechanics (1) • Drivers (3)
Service Development Meetings (Biweekly and on-demand)	• Service Developers (2) • Project Manager (1) • Technical Researcher (1) • Informatics Researchers (3)
Workshops	• Service Developers (2) • Business Area Representative (3) • Informatics Researchers (3)
Monthly Project Meetings	• Service Developers (2) • Project Manager (1) • Informatics Researchers (3) • Technology Developers (2) • Technical Researchers (3)
Documents (Meeting notes, weekly Project reports, mail correspondence)	

Table 1: Summary of data collection activities

In the data analysis process, as data analysis materials, the transcription from the recordings of interviews and workshops, notes of monthly project meetings and other meetings, and the documents are used. The materials are coded using the qualitative coding types described by Richards (2009). Richards (2009) states three types of coding such as, descriptive coding, topic coding and analytical coding and he emphasizes that all three types of coding are required for a passage of text (in an interview transcript or meeting notes). Descriptive coding allows the researcher to store the information about the speaker (in our case, for example, a traffic manager in a bus operating company). Topic coding allows to code the topic that is being discussed in the text. Topics such as, repair, cost, time, maintenance etc are used for topic coding when the texts are coded. Finally, analytic coding helps us to identify what's going on in a passage of text, i.e., identifying several themes that are worth noting. According to Richards (2009), the analytic coding finds out categories that are not known before.

5 Results

5.1 Problematization

Problems, solutions and key roles are identified in this first stage of translation process, (Callon, 1986). The technology development group of a vehicle manufacturing company identified problems with the preventive maintenance of the vehicle that is done on a scheduled basis. They realized that preventive maintenance sometimes causes unnecessary change of vehicle parts and engine oil and yet that type of maintenance do not guarantee that breakdown of the vehicles will not occur. As one technology developer mentioned,

The current scenario with preventive maintenance is mostly about scheduled maintenance. Vehicles that are covered by service contracts are taken to the maintenance facility once in six months or a year and the maintenance staff check the vehicles and change parts, engine oil even if that are not required. Still break-down occurs as it is not possible for the maintenance staff to check everything in a vehicle.

So, the technology development department started to find a solution to it. For technical knowledge sharing for the accurate implementation of the technology, the technology development department first invited technical researchers (computer scientists) from the academia. Two more employees from the technology development department started working as service developers who got the responsibility for market research, customer requirement analysis, business modeling etc. Also informatics researchers (including the author) from academia were invited to work together with the service developers to share knowledge regarding digital innovation of services. These actors then contact the people from different business areas such as people from areas that deal with maintenance services of different types of vehicles (Buses, Trucks). The local transport authority was also contacted and they agreed with the problem. One bus operating company was contacted as the key customer of the vehicle manufacturer. Traffic managers, drivers and service mechanics from bus operating company were invited to talk about the problems with bus maintenance. They seem to be aware of the problem. One traffic manager stated,

Break-down is very common in bus operation. The most awkward thing is, we don't always have many spare buses. So break-down is something that any bus operating company would like to avoid.

So, the technology developers proposed a solution to the problem and started developing a system that will predict the fault in advance and diagnose the fault. As one technology developer explained in a meeting:

The technology that we are developing is different from the current maintenance services. The embedded device and the sensors in the vehicle will remotely monitor the vehicle and predict all possible faults that can occur and send precise information to the control room remotely, that means when the vehicle is running on the road. So, the probable fault will be diagnosed well in advance and the vehicle will be called for maintenance before any break-down occurs.

Another technology developer mentioned,

The main issue here is that we need to know different types of problems that occur in the buses so that we can take initiative to solve those problems through remote diagnostics. This will create opportunity for developing different services based on this digital technology. So, we need to talk to the people who deal with bus maintenance and operation.

The bus operating company personnel, service contract business people accept this technological solution. As one of them mentioned:

If a system can really predict the fault well before it occurs, it will make our job really easy.

The table below shows the actors that are identified at the problematization stage. Due to the nature of the problem and solution, some other actors may emerge over the course of time.

Actors	Actors' Roles and Interest
Technology development department	Developing the technology
Maintenance Service providers	Providing knowledge about the vehicular faults and maintenance so that their problem regarding vehicle maintenance can be solved
Bus operating company	Providing knowledge for the everyday experience on bus operation and maintenance so that the technology developers develop maintenance services that can stop break-down and reduce maintenance cost
Academics	Knowledge sharing regarding the technology implementation and digital innovation of services.
Local transport authority	Providing knowledge about transport operation in the region for smooth operation.
Remote diagnostics Technology	The technology that will remotely monitor and diagnose problems in the buses well in advance so that the bus can avoid break-down.

Table 1: Identified human and non-human actors and their interests

5.2 Interessement

In Interessement, actors commit to the problematization offered (Callon, 1986). They adjust according to the proposed identity and future of the actor-network and approach the roles to be played by them in the network (Mähring et al., 2004). During the meeting and workshops the technology developers described the potential of remote diagnostics technology to the other actors. The technology developers explained the technology to the actors in the network and claimed that remote diagnostics technology will diagnose many problems involving engine, brakes, gear oil temperature, transmission and many other parts and there will be no break-down. So, the technology and service developers from the technology development department asked other actors about the interest and expectation regarding the remote diagnostics technology.

So, the other actors expressed their views about the technology. For example, during a workshop, a business area representative who is a potential customer of the remote diagnostics based e-maintenance services stated about his expectation from remote diagnostics:

… I have heard about sensors used for predicting repair situations. Not really heard of using onboard information to the extent that you are discussing. But the information obtained from

remote diagnostic system need to be accurate, it can't be misinterpreted. It should be facts telling about a component is going to be broken down. The information must be black and white not grey and confusing. ....and the information should also be tied with next necessary steps.

One maintenance manager expressed his doubt about the technology,
We have system for measuring the tyre pressure, but it is not reliable. So, we measure it manually. So, I suppose the services provided by remote diagnostics will have to be reliable and trustworthy. Reliability of any technology will always be an issue.

Some other participants expressed their views in different ways during the interviews, workshops and meetings. One comment from an interviewee points towards the initial implementation of the technology:

The technology should be started in a smaller scale. Using it to find out some fatal errors and see how we can remove those errors.

There is an evidence of why remote diagnostics technology should be introduced in the vehicle industry and who can use the information obtained from the technology. During a meeting a business representative stated:

Remote diagnostic may be used for uptime services of the commercial vehicle and to create commercial offerings in the future. The customer service representative will be able to use the information obtained from remote diagnostics to take it as a notification for next service.

Saving the time is a big advantage in remote diagnostics of vehicles. Any technology that can save some time for maintenance will be regarded as a big contribution. Remote diagnostics has a big opportunity in that area. A business area manager explained:

Maintenance and repair take a lot of time. There are some parts in an automobile that take a lot of time to repair them if they get broken. Time will be saved if a system predicts that something is wrong with a part and that part should be changed.

The views of the participants who showed scepticism regarding the technology were taken seriously by the technology developers. They started to design the technology in such a way that the existing problems with the current technological systems will not exist in the remote diagnostics technology. As a result of this, those participants showed interest in further activities in the network. This aspect can be mapped with locking the allies (Callon, 1986).

5.3 Enrolment

Enrolment concerns the negotiation of roles between actors in the actor-network under formation (Callon, 1986). The technology developers and the technical researchers contacted the bus operating company and made an agreement to install the device in their buses so that the experiments regarding the monitoring of different parts of the vehicles can be done. Initially the technology that is being used in the buses is in very early stage. Along with that the technology developers keep discussing with the traffic managers, drivers of the bus operating company about their experience regarding bus operation. The service developers and the informatics researchers talked to a traffic manager of the bus operating company to assist in visualizing the services that can be developed from the remote diagnostics technology. As one service developer explained:

RDS (Remote diagnostics system) can be compared with the invention of electricity which was initially used just for lighting bulbs. But later on it was used for numerous purposes such as operating

different home appliances. Everyday different types of use of electricity are being developed. Now we hear about electric cars. In the same way, RDS is not just about monitoring the status of the engine. Several services can be developed based on the remote diagnostics technology and many services can be included later on with the existing services. Right now identifying all possible services is difficult. For example, I can see that driver behavior can also be examined through this technology to check how smoothly or roughly the driver drives the bus. Other services can be developed together with different people from vehicle industry.

The traffic manager agreed to assist in visualizing the future services that can be built around remote diagnostics. Together with him and few drivers and service mechanics various services will be visualized in the coming days.

The technology developers kept negotiating with the bus operating company to get insight into bus operation. They started discussing with the drivers of the bus operating company regarding the bus operation. They found a new problem with the buses that they initially did not anticipated at all. The doors of the buses seem to be a major concern for the bus drivers. As one bus driver said,

Sometimes doors don't get closed automatically as they normally do when the button is pressed from driver's panel. It can be a real headache. Drivers should not drive the bus with the doors open. It is not safe. Something should be done with the doors.

As the technology developers did not think about the door problem in the beginning, they had to make slight changes in their plan. But technology developers first wanted to make sure the technology worked perfectly for engine, brakes etc. So, they did not give the door problem a top priority although according to the drivers that should be first priority. A small conflict arose.

6 Discussion

This research addresses the question: How can different stakeholders be involved in co-creating digital services in the context of digital innovation? Following translation processes of ANT (Callon, 1986), this research shows how different actors can act together in co-creating innovative digital services. The first stage focuses on identifying problem, solution and key roles. The main objective of this stage in case of digital service co-creation is to ensure that the prospective customers also agree with the problem that is identified by the service developers. The findings show that the potential customers also agree with the problem with the existing maintenance system with the vehicles. That paves the way for the service developing company to propose a solution to the problem. The service developing company also identifies the actors that will be useful to co-create the digital services. The findings at the problematization stage points to the fact that during the digital service co-creation, all the participating actors need to agree with the existing problems and potential solutions. It is not the case where only the developers play the role of 'problem identifier' and solver.

During the interessement stage, it has been found that actors can have scepticism and lack of trust on digital technology and technological innovation. Innovation depends on interpersonal trust between stakeholders (Dovey, 2009). In our case, the main actor (technology development department) has to make sure that the other actors have trust on the digital innovation of services and show interest in the innovation activities. So, it can be argued that the interessement stage is the stage where the main actor is required to establish trust among the other actors regarding the outcome of technological innovation. From our empirical

findings we can say that during the co-creation of innovative digital services, establishment of trust among different actors regarding the outcome of digital innovation is required for successful involvement of different actors in the co-creation activities of digital innovation.

Empirical findings suggest that prioritization is another issue in successful involvement of different actors in the co-creation of digitally innovative services. Findings show that the main actor has some pre-understanding about the problems and emphasizes to solve those problems. But other actors show importance to other problems based on their experience. It can create conflict in co-creation activities and can be a problem in digital innovation. When prioritization is not established among the actors during translation processes, it can affect negatively in the involvement of different actors in co-creation activities of digital innovation.

While discussing about co-creating mobile phone services, Kristensson et al. (2008) state that knowledge should be generated from user situation to ensure success in customer involvement. From our empirical findings we can see a different scenario. Our case of digital innovation is an example of making a shift from non-digital to digital services. The remote diagnostics technology for the maintenance of vehicles was not previously used by the actors who are potential customers/users. That poses the difficulty of creating it from user situation that is possible in co-creating mobile phone services as people have been using mobile phones for many years. In our case, actors with previous experience with vehicles have been involved in co-creation of the digital services for vehicle maintenance. We can say that although knowledge may not be generated from user situation, the customers or users with experience in related phenomenon can still work as the co-creator of digital services.

Kristensson et al. (2008) also state that user involvement is more likely to be successful if users are intrinsically motivated by an apparent personal benefit. Our case has a B2B setting and the findings also show that the potential customers can definitely be involved in the co-creation if they are informed about their commercial benefit. That will be a huge motivation for them to be involved in co-creation. The vehicle operators have been facing problems with maintenance and they have seen advantages of the remote diagnostics systems. The main actor was successful in explaining that to the other actors. Thus the other actors agreed to get involved in co-creating the digital services.

Our findings suggest different aspects of involving different stakeholders in the co-creation of digital services in the context of digital innovation. Some aspects point to the existing knowledge about co-creation of services or products and show the differences between the co-creation of digital services and the other kind of services.

7 Concluding Remarks

The research makes contribution by applying ANT's translation processes in the aspect of co-creation of innovative digital services. The research contributes to the literature of digital innovation by presenting two propositions regarding the co-creation of digital services in the context of digital innovation. The translation processes can be applicable for co-creation of many other types of digital services. The practical significance of this research is that it shows how different stakeholders can be brought together for developing commercial digital services.

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