

# Digitalization Boosting Novel Digital Services for Consumers

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## Abstract

Digitalization has changed the world. The digital revolution has promoted the Internet, and more recently mobile network infrastructure, as the technological backbone of our society. Digital technologies have become more integrated across all sectors of our economy and society, and create novel possibilities for economic growth. Today, customers are more and more interested in value-added services, compared to the basic products of the past. Novel digital services, as well as the use of mobile services, has increased both at-work and during free time. However, it is important to understand the needs and expectations of the end users and develop future services with them. This paper focuses on pointing out the importance of user involvement and co-design in digital service development and providing insights on transformation caused by the digital revolution. Experiences and effects of user involvement and co-design are introduced with details via two case studies from the traditional retail domain.

**Keywords:** *digital services, digitalization, user involvement, co-design, retail.*

## 1. Introduction

The digital revolution is everywhere and it is continually changing and evolving. Information technology (IT) innovations, such as the Internet, social media, mobile phones and apps, cloud computing, big data, e-commerce, and the consumerization of IT, have already had a transformational effect on products, services, and business processes around the world [1]. In fact, information and communications technology (ICT) is no longer a specific sector, but the foundation of all modern innovative economic systems [2]. Digitalization is one of the

successful themes for economic growth: data is often considered as a catalyst for overall economy growth, innovation and digitalization across all economic sectors. For example, in Europe the Big Data sector is growing by 40% per year, seven times faster than the IT market [3].

Digitalization is affecting people's everyday lives, and changing the world. The pervasive nature of technology in consumers' lives also causes a rapid change in the business landscape [4]. The value of the ICT sector's manufacturing and services will increase faster than the world economy on average [5]. Thus, companies have to move their business into digital forms. Business models must change to support and improve new business opportunities, which are created together with the services. In order to build up an excellent digital service that meets the customers' needs, participatory design of the service is inevitable [6].

To be successful, innovative solutions must take into account opportunities provided by new technology, but they cannot lose sight of the users. In practice, companies have understood how important it is to understand the needs and expectations of the end users of the product or service. Users are experts on user experience and thus are a significant source of innovation [7]. Involving different stakeholders in the value chain, from the very start of the development process, increases customer acceptance, gives the developers new development ideas and gives the users feelings that their voices have been heard. The interaction with the customer is the key issue. That is, keeping customers satisfied in a way that they feel that the service provider listens to them and appreciates their

opinions and activities is of major importance. This will make it possible for companies to obtain and keep loyal customers. [8]

This paper focuses on pointing out the importance of user involvement and co-design in digital services development and providing insights of transformation caused by digital revolution. Experiences and effects of user involvement and co-design are introduced with details via two case studies from the traditional retail domain. The research was done as a part of large Digital Services (DS) program (<http://www.digital-services.fi>) facilitated by DIGILE (<http://www.digile.fi>), one of Finland's Strategic Centers for Science, Technology and Innovation. DIGILE points out that ICT-based digital services are the most important way to provide added value to customers. Thus, DIGILE is focused on promoting the development of digital service know-how for business needs.

The case studies described in this paper, Case A and Case B, are introduced in detail for illustrating user involvement and co-design while developing new digital services for a traditional retail sector. In Case A, novel omnichannel services for the customers were integrated into the retail processes to better serve and meet the needs of the store's rural customers closer to their homes. Customers living in rural areas were known not to have access to the larger selections of the retailer's online stores. The second, Case B, aimed to understand consumer attitudes towards novel digital service points in hypermarkets. Customers were able to test the first version of a novel user interface to be used in digital service points. The case studies emphasized the importance of user involvement and co-design while developing new digital services.

This paper is structured in the following way. In the second chapter background information about the DIGILE Digital Services program and digitalization in general are given. Also, relevant literature concerning the retail sector and the context of the case studies are introduced. The third chapter presents the research approaches used with the two case studies. In the fourth chapter case study findings are introduced and discussed. Finally, in the fifth chapter the main findings are summarized and concluded.

## 2. Background

In this chapter, the DS program is introduced with some examples of developed digital services in order to build a complete picture of where the case studies were carried out. After that, an overview of digitalization and its' effect on digital services are presented. Finally, digitalization in the retail sector, the environment of our case studies, is introduced in detail.

### 2.1 Digital Services Boosting the Finnish Economy

In the beginning of the DS program DIGILE, Finnish industry and Academia of Finland (<http://www.aka.fi/en>) together identified four themes which would lead the Finnish economy towards having the best means to reach an advantageous position in the global market for mobile services. The themes were 1) small and medium enterprises (SME) services, 2) financial services, 3) educational services, and 4) wellness services. The main aim of the DS program was to create and begin to implement various digital services, service platforms and technologies which promote new or enhanced services, as well as to ensure maintenance of new services in selected areas. The structure of the DS program is presented in Figure 1.

In the DS program, work was conducted in a true partnership model, meaning that the program provided a pool of complementary platforms where partners shared and trialed their innovations and enabler assets. The mission was accomplished by creating new innovative services in these selected sectors and by recognizing the need of enablers in their context. The ecosystem thinking played a central role during the whole program.

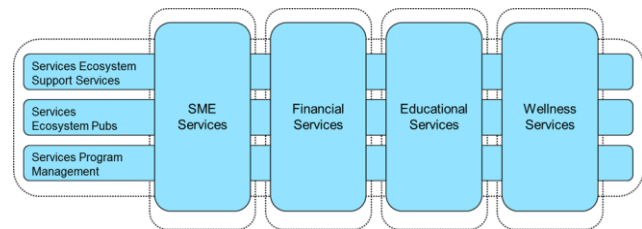


Fig. 1 The structure of the Digital Services program.

The key objectives for the *SME services* were optimizing service creation tools for SMEs and sharing of know-how in service building to enable a new class of service development. The SME theme targeted creation of a pool of companies implementing key services by or for the SME sector. SMEs supported the whole services ecosystem by utilizing and trialing service platforms offered by the program. A pull of additional platform features was created, and SMEs acted to create new service products for their business. Rapid prototyping and iterative research methods were utilized.

In the case of *financial services* the program concentrated on services and service enablers which bring added value to the companies, customers, as well as to consumers, and linked money transactions and financial services smoothly to the ecosystem market. The goal was to introduce mechanisms and platforms for service developers, enabling financial transactions in the services and to develop safe and flexible trust enablers, as well as cost-

efficient banking and payment tools, for both existing and new innovative mobile services.

The goal of *educational services* was to increase the utilization and availability of e-learning materials and services in education. It was not only concentrated on support for mobile and pervasive learning, but on high quality services that could be easily integrated into everyday processes of the ordinary school day. User perspectives played an important role; this was seen as especially important in cases that aim at the global market or developing services for challenged learners.

In the case of *wellness services* the aim was to create a wellness ecosystem with common platform access and the capability to develop enablers and tools for integrating different categories of value adding services and technologies. It was also targeted towards developing components and capabilities for integrating technologies for automatic wellness data collection. Data analysis will be facilitated by developing and enabling the integration of tools for professional wellness data analysis and content delivery.

During 2012-2015, 85 organizations (53 SMEs, 19 large companies and 13 research organizations) in total participated in the DS program. The program exceeded the goals by achieving 27 highlighted new services and 18 features. In addition, three new companies were established. One of the successful examples of results achievement is Personal Radio. This offers consumers new services and personal content from different sources based on recommendation engine technology. The ecosystem thinking was an enabling asset: there have been several companies involved in trying to create the service, e.g., companies to take care of content production and delivery, speech synthesis, audio search, content analysis, payment system, concept design, user interface, business models, user experience and mobile radio player. In addition, in the wellness services domain several wellbeing services were developed. For example, novel mobile services to prevent illnesses, such as memory disorder or work-related musculoskeletal disorder, were developed. Novel option for traditional marital therapy and coaching methods is now available in mobile also. In this paper, two pilot cases are introduced as examples of digitalization and developing digital services in the retail sector.

## 2.2 Digitalization Effects on Services and Business

The digital revolution has promoted the Internet and more recently mobile networks infrastructures as the technological backbone of our society. The Internet and digital technologies have become more integrated across all sectors of our economy and society [9]. Digitalization

changes the world and affects people's everyday lives. The huge impact of digitalization and the Internet will be felt in different industrial and associated sectors, for example, 3D printing, smart city services (e.g. lighting control, temperature optimization), predictive maintenance solutions, intelligent logistics, smart factories, etc.

Digitalization also means that businesses make use of electronic information exchange and interactions. For example, digitalization in factories allows end-to-end transparency over the entire manufacturing process, so that individual customer requirements can be implemented profitably and the produced solutions managed throughout their life cycle. Existing businesses can be modernized using new technologies, which potentially also generate entirely new types of businesses. Evans and Annunziata [10] highlight the promise of the Industrial Internet by stating that it is the 3<sup>rd</sup> innovation wave – after the Industrial Revolution (1<sup>st</sup> wave) and the Internet Revolution (2<sup>nd</sup> wave). The growing importance of context-awareness, targeting enriched experience, intuitive communication services and an increasingly mobile society, requires intelligent services that are smart, but invisible to users. Hernesniemi [11] argued that the value of the ICT sector's manufacturing and services will increase faster than the world economy on average. For example, e-Commerce is growing rapidly in the EU at an average annual growth rate of 22%, surpassing EUR 200 billion in 2014 and reaching a share of 7% of total retail sales [12].

In the digital economy, products and services are linked more closely to each other. The slow economic growth during recent years has boosted the development of product-related services even more – these services have brought increasing revenue for the manufacturing companies in place of traditional product sales. The global market for product and service consumption is steadily growing. Today consumers are key drivers of technology and change as new digital tools, e.g., comparison websites, social media, customization of goods and services and mobile shopping, have empowered them [13]. Customers are more and more interested in value-added services compared to the basic products themselves.

Now, companies around the world are not only willing to use digital technologies to obtain transformation—they must [14]. Companies are working towards achieving digital transformation, but still most are lacking experience with emerging digital technologies and they are skeptical. The key issue is to respond effectively and quickly to newly available technologies in order to gain better customer experiences and engagement, streamlined operations and new lines of business. Accordingly, digital services are a strong global trend in the world: long-term

development is moving the weight of economic value creation from agriculture, to goods, and then services. The service sector is the fastest growing segment of global economies. Figure 2 illustrates the trend in the USA.

ICT has a remarkable impact on the development of services; ICT enables completely new services, increases the efficiency of service production, enhances the availability of services, and increases the profitability of service business. Kettunen et al. [15] have identified six megatrends in ICT and ICT enabled services; 1) data-intensiveness, 2) decentralized system architectures, 3) fusion of real and virtual, 4) disappearing (or hidden) human interface, 5) web-based organization of work and life, and 6) increasing need to manage social robustness. For example, the advantage of the data-intensiveness is that the service providers can automatically collect and analyze a large amount of customer or process data, and also combine it with other data that is available free of charge. This helps service providers to develop their services, e.g., by customizing the services and creating new ones.

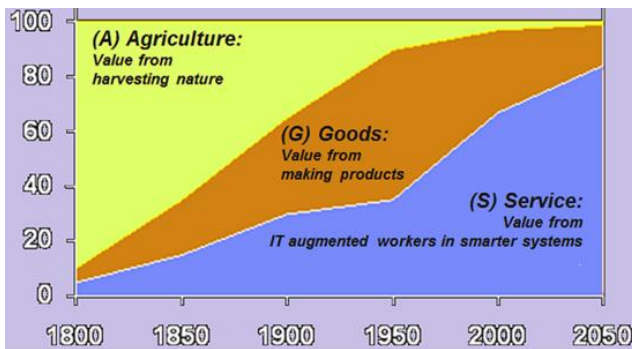


Fig. 2 Long term industry trends [16].

The use of mobile services has increased both at work and during free time, and social communities are increasingly formed. People are able and willing to generate content and the line between business and private domains is increasingly blurred [17]. The idea of everybody having their own personal computer is being reborn and has evolved into everyone having their own personal cloud to store and share their data and to use their own applications [18]. This is driving a power shift away from personal devices toward personal services.

Currently, digital signage is widely used in different environments to deliver information about a wide array of topics with varying content formats. Digital signs are generally used in public spaces, transportation systems, sport stadiums, shopping centers, health care centers etc. There are also a growing number of indoor digital displays in shopping centers and retail stores. The underlying goal

of these displays is to provide better service for customers and promote sales. From a retail perspective, these displays can be seen as one of the many channels that aim to capture people's attention and affect their customer behavior.

### 2.3 Digitalization of the Retail Sector

The retail sector is considered one of the most rapid technology-adoptive sectors (e.g., [19]). Over the years, retailers have learned how to design their stores to better meet shoppers' needs and to drive sales. In addition, the technical infrastructure that supports most retail stores has grown enormously [20]. The retail industry has evolved from traditional physical stores, through the emergence of electronic commerce, into a combination of physical and digital channels. Seeing the future of retailing is quite complex and challenging; busy customers expect that companies use innovative approaches to facilitate their shopping process efficiently and economically, along with providing value-added shopping experiences. People no longer only go shopping when they need something; the experience of shopping is becoming more important [21].

There are a number of challenges and opportunities retailers face on their long-term radar, such as changes in consumer behavior and consumer digitalization. These drivers affecting the retail sector should be a key consideration for retailers of all shapes and sizes [22].

It is likely that the power of the consumer will continue to grow [23], and from the demand side, consumers will be empowered to direct the way in which the revolution will unfold [24]. The focus on buying behavior is changing from products to services [25]. Thus, the established retailers will need to start considering how they can more effectively integrate their online and off-line channels to provide customers with the very highest levels of service.

It is now widely recognized that the Internet's power, scope and interactivity provide retailers with the potential to transform their customers' shopping experiences, and in so doing, strengthen their own competitive positions [26]. Frost & Sullivan [27, 28] predicts that by 2025, nearly 20% of retail will happen through online channels, with global online retail sales reaching \$4.3 trillion. Thus, retailers are facing digitalization of the touch-point and consumer needs [29]. By 2025, 80 billion devices will connect the world with each person carrying five connected devices [30]. Mobile and online information technology make consumers more and more flexible in terms of where and how they wish to access retailer information and where and how to purchase products. Consumer behavior is changing as a growing number of smarter, digitally-connected, price-conscious consumers

exploit multiple shopping channels, thus making the multichannel retail approach an established shopping behavior [31]. Described as channel agnostic, modern consumers do not care whether they buy online, via mobile or in-store as long as they get the product they want, when they want it at the right price. A new behavior of test-and-buy-elsewhere is becoming more common [32] and retailers must adapt to the buying behavior of these “channel-hoppers” [33]. Aubrey and Judge [34] talk about ‘digital natives’ who are highly literate in all things digital, and their adoption of technology is easy and distinctive.

However, simply “adding digital” is not the answer for retailers – yet that is an approach too often taken [35]. For traditional retailers to survive, they must pursue a strategy of an integrated sales experience that blends online and in-store experiences seamlessly, leading to the merger of a web store and a physical store [36]. According to Frost & Sullivan [37], the retail model will evolve from a single/multiple channel model to an integrated hybrid cross-channel model, identified as *bricks and clicks*. Thus, shoppers of the future float seamlessly across mobile, online and real-world platforms [38].

Adoption of both online and physical channels, to sell simultaneously through multiple marketing channels, is referred to as *multichannel retailing* [39]. Today, in an ever digitizing world the line between channels is fading as the different channels are no longer separate and alternative means for delivering shopping services, but customers increasingly use them as complements to each other, or even simultaneously. Hence, the term multichannel is not enough to describe this phenomenon, and instead the new concept of *omnichannel* is adopted [40]. Omnichannel is defined as “an integrated sales experience that melds the advantages of physical stores with the information-rich experience of online shopping”. The customers connect and use the offered channels as best fits their shopping process, creating their unique combinations of using different complementary and alternative channels. In an omnichannel solution the customer has a possibility to seamlessly move between channels which are designed to support this “channel-hopping”.

Payne and Frow [41] examined how multichannel integration affects customer relationship management and stated that it is essential to integrate channels to create positive customer experiences. They pointed out how a seamless and consistent customer experience creates trust and leads to stronger customer relationships as long as the experience occurs both within channels and between them. Technology-savvy consumers expect pre-sales information, during-sales services and after-sales support through a channel customized to their convenience [42].

All these needs and requirements must come together as a unified, holistic solution, and retailers should be able to exploit the channel-specific capabilities in a meaningful way [43].

### 3. Developing New Digital Services

In this chapter the research approaches for our case studies are introduced in detail. The case studies emphasize user involvement and co-design while developing new digital services.

#### 3.1 Case Study A

In this research context the retailer wanted to integrate novel services and adapt retail processes to better serve and meet the needs of the store’s rural customers closer to their homes. Customers living in rural areas were known not to have access to the retailer’s online store’s larger selection. In the development of the novel service concept the utilization of Internet possibilities and the importance of sales persons guiding and socializing alongside the customers at the physical store were also emphasized [44].

Case study A was conducted in the context of developing and piloting a novel omnichannel service concept for a Finnish retail chain (described in more detail in [45]). A starting point for the new service was a need to provide a wider selection of goods for the customers of a small, distant rural store. The store is owned by a large national co-operative retail chain.

The service concept was based on the idea of providing customers with the selection available in large stores by integrating an e-commerce solution within the service of a rural store. This was practically done by integrating the service provider’s digital web store to the service processes of the small brick-and-mortar store. Burke [46] suggests that retailers who want to web-enable their store should optimize the interface to the in-store environment instead of just providing web access. Thus, one of the driving design principles of our case study was to achieve a seamless retail experience by a fusion of web and physical retail channels. The novelty of the service concept was in how it was integrated to the service processes of a physical store, i.e., how the different channels were used together to create a retail experience that was as seamless as possible.

A co-design process was used in the service design. The build-and-evaluate design cycle involved a small group of researchers and the employees of the retail company. The researchers were active actors in the design process, participating in the service concept design and facilitating co-design activities. Technical experts of the retail

organization were involved in specification of how the developed solution would best integrate with the existing infrastructures of the organization, and how the new solutions related to the strategic development agenda of other related omnichannel solutions. Retail experts were involved in designing the customer journey, tasks of the staff, the service solution’s visual and content design, and internal and external communication required by the service.

The pilot study was conducted in a small rural store that was part of the service provider’s retail chain, located in the city of Kolari (www.kolari.fi) in northern Finland, with a population of 3,836. The customers visiting the physical store could access the selection of goods otherwise not available through a web store interface. The study was launched with a goal of eventually scaling up the digital retail service concept to other small rural stores of the service provider. The retail service included a *touch screen customer terminal* located inside the physical store (see Figure 3).

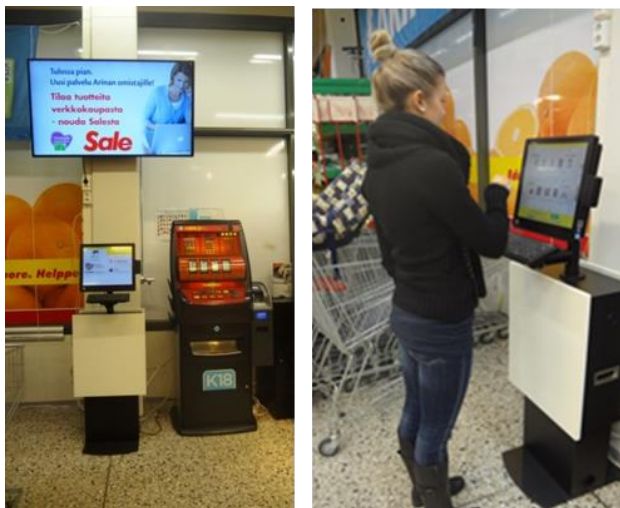


Fig. 3 The digital retail service inside the store.

The customers could use the terminal for browsing, comparing and ordering goods from the retail provider’s web store selections. The two web stores accessible through the customer terminal were already existing and available for any customers through the Internet connection. In addition, the retailer piloted the marketing and selling of their own campaign products through a new web store interface available on the customer terminal. The customers could decide whether they wanted their product order delivered to a store (the delivery was then free of charge) or directly to their home. After placing the order, the customer paid for the order at a cash register at the store alongside their other purchases. The customer terminal was also accompanied by a large *information*

*screen* (located on the wall above the terminal) that advertised the new retail service concept and directed the customers in its use.

### 3.1.1. Research Approach of Case Study A

The focus of the research was on more closely investigating and analyzing the customer and personnel service experience and deriving design implications from the gained information for developing and improving the service concept further. The user experience data collection methods and the number of stakeholders for each method are listed in Table 1.

The research study was focused on the two main user groups: store customers and personnel. Altogether 35 store customers were interviewed, and of these 10 also experimented with the service hands-on by going through the controlled usability testing. The ages of the study participants among the customers varied from 21 years to 73 years. Altogether six members of the store personnel participated in the interviews.

Table 1. Summary of the data collection methods and number of participants for each method.

Data collection method	Number of participants
Interviews with store customers	35 store customers
Usability testing	10 store customers
Paper questionnaires	10 returned questionnaires
Group interviews with store personnel	6 members of store personnel
Phone calls	1 store superior
Automatic behaviour tracking	~484 service users

A set of complementary research methods were used to monitor and analyze the retail experience. The interviews were utilized as a primary research method, accompanied by in-situ observation at the store and a questionnaire delivered to customers. These qualitative research methods were complemented with quantitative data achieved through a customer depth sensor tracking system installed inside the store. Interviews were utilized to research customer and personnel attitudes and expectations towards the novel service concept, motivations for the service adoption and usage, their service experiences, and ideas for service improvement. Two types of structured interviews were done with the customers: a) General interview directed for all store customers, and b) interview focusing on the usability aspects of the service (done in the context of the usability testing). Usability testing, accompanied with observations, was conducted to gain insights into the ways customers used the service.

Paper questionnaires were distributed for the customers who had ordered goods through the service, with a focus on gathering data of their experiences with the service ordering process. Also a people tracking system based on

depth sensor was used to automatically observe the customers. The special focus of the people-tracking was to better understand the in-store customer behavior, and to collect data in more detail of the number of customers using the service through the customer terminal, and of the duration and timing of the service use.

### 3.2 Case Study B

In Case B, the retailer's goal was to improve customer service in the consumer goods trades by implementing novel digital service points in the stores. Generally, using these displays customers were able to browse the selection of consumer goods and search detailed information about the products. On displays customers were also able to see advertisements and campaign products available at the store. Customer displays help consumers in making purchase decisions by providing guides and selection assistant. In addition to that, customers can get help to find certain products from the bigger store by utilizing a map service. It has also been planned that customers could use the displays to find a wider selection of consumer goods from the online shop and place the online order in the store.

This case study aimed to understand consumer attitudes towards digital service points in Prisma hypermarkets. The research was divided into three tasks:

1. Digital service points as a service concept
2. Type and location of the digital service point in the store
3. Online shopping in the store.

In the study, customers were able to test the first version of the novel user interface to be used in digital service points in stores and compare different screens. The goal was to gather information about customer experience, their expectations and needs, and also ideas of how to develop the user interface further. A test setup of the study is presented in Figure 4. The novel user interface was tested with the big touch screen (on right). The other touch screens were used to test with the web store content just to get an idea about the usability of the screen.

#### 3.2.1 Research Approach of Case Study B

The work was carried out in the laboratory environment, not in the real hypermarket. Consumers were invited to participate in a personal interview where their attitudes towards customer displays were clarified. The interviews were divided into two phases. First, the background information and purchase behavior was discussed and the novel digital service concept was presented to the customers. In the second phase they were able to test the proof of concept version of the user interface and compare different types of devices (two bigger touch screens and

one tablet device). Consumers were able to freely comment on their experience and they were also interviewed after testing the novel service prototype.

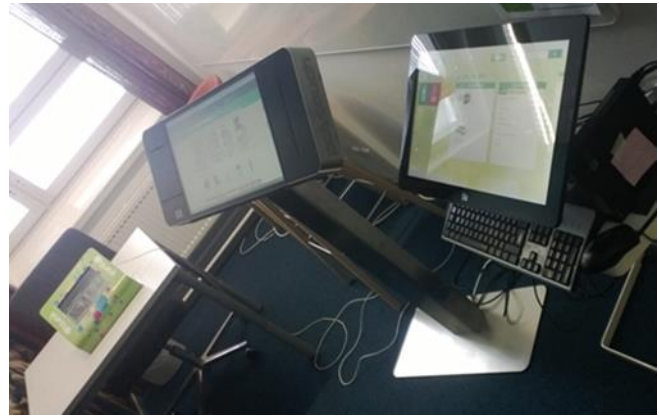


Fig. 4 Test setup in the study.

## 4. Results and Findings from the Case Studies

In this chapter the main results and findings of the case studies are presented in detail for introducing user involvement in the development process.

### 4.1 Results of Case Study A

The findings from Case Study A are analyzed from the viewpoint of two end-user groups, namely the rural store customers and personnel.

#### 4.1.1 Store Customers

Altogether, 35 customers of the store were asked about their attitudes, expectations, and experiences related to the novel retail service concept.

**Interviews and paper questionnaires.** When asked *whether or not the customers were likely to use the novel retail service* on a scale of 1-5 (where 1 = not likely to use, 5 = likely to use), *the average was 2.6*, resulting in 16 interviewees responding not likely to use the service and 19 interviewees responding likely to use the service.

Regarding those 16 customers stating not likely to use the novel retail service, the age distribution was large, as this customer group consisted of persons aged between 21 and 73 years, the average age being 44 years. The gender distribution was very even; 10 men vs. 9 women (some respondents comprised of couples who answered the researchers' questions together as one household). Except for one person, all the interviewees said they visited quite regularly the nearest (over 150 kilometers) bigger cities for shopping purposes. Of the 16 respondents 13 had either no or only little experience with online shopping. This

customer group gave the following reasons for not being so eager to adopt the novel retail service in use (direct quotes translated from Finnish):

*"I do not need this kind of a service."  
"Everyone has an Internet connection at home. It is easier to order [products] from home."  
"Might be good for someone else..."*

On the other hand, 19 responders stated that they were likely to use the retail service in the future. Also in this customer group the gender distribution was very even, as the responders consisted of 10 men vs. 11 women. The age distribution was respectively diverse, from 29 to 72 years, the average age being 51 years. In addition, everyone regularly made shopping journeys to the closest bigger cities. In this customer group, 11 respondents had some experience with online shopping, with six respondents stating they often ordered products online. These customers justified their interest towards the novel retail service in the following ways (direct quotes translated from Finnish):

*"Everything [new services] that comes need to be utilized so that the services also stay here [in Kolari]."  
"We do not have much [product] selections here."  
"Really good... No need to visit [bigger cities] if we do not have other businesses/chores there."  
"Sounds quite nice... If there would be some product offers."  
"If there [in the digital retail service] would be some specific product that I would need, then I could use this."*

To conclude, age or gender did not seem to have an effect on the store customers' willingness to use the retail service. Neither did the shopping journeys to bigger cities influence the willingness for service adoption, as most of the customers made these shopping journeys regularly. However, previous experience with online shopping appeared to have a direct effect on the customers' willingness to use the retail service. If the customer did not have, or had only little previous experience with ordering products from web stores, the person in question often also responded not likely to adopt the retail service into use. However, if the customer was experienced with online shopping, they had a more positive attitude and greater willingness to use the novel retail service.

Paper questionnaires were distributed to the customers who had ordered products through the retail service (either at home or through the store's customer terminal), with the goal of researching customers' experiences with the ordering process. These customers identified the most positive aspects of the service as the following: 1) wider product selections, 2) unhurried [order process], 3) easy to compare the products and their prices, 4) fast delivery, and 5) free delivery.

**Usability testing.** A total of ten store customers participated in the usability testing. The customers were directed to go through a set of predetermined tasks with the retail service interface, and they were asked to "think aloud" and give any comments, feedback and thoughts that came to their mind during the interaction with the service. Their task performance was observed by the researchers and notes were taken during the customer's experimentation with the service. The tasks included 1) browsing the product selections available through the web stores, 2) looking for more detailed product information, and 3) ordering a product from two different web stores.

The biggest difficulty the customers encountered was related to the touch-based interaction with the service terminal. The terminal's touch screen appeared not to be sensitive enough, resulting in six out of ten customers experiencing difficulties in interacting with the touch screen. In addition, it was not immediately clear for the customers that the terminal indeed was a touch screen, as six customers hesitated at first and asked aloud whether the terminal had a touch screen: *"Do I need to touch this? / Should I touch this?"*

However, interestingly four customers out of ten changed their initial answer regarding their willingness to use the service (asked before actually experimenting with the service UI) in a more positive direction after having a hands-on experience with the service. Thus, after usability testing, the average raised a bit from the initial 2.6 to 2.7 (on a scale of 1-5). None of the customers participating in the usability testing changed their response in a negative direction. Other valuable usability findings included observation on the font size on the service UI, insufficient service feedback to the customer, and unclear customer journey path.

**Automatic tracking of store customers' behaviors.** A depth sensor-based system was used for detecting and tracking objects (in this case people) in the scene, i.e., inside the physical store. Depth sensors are unobtrusive, and as they do not provide actual photographic information, any potential privacy issues can be more easily handled. The sensor was positioned so that it could observe the customer traffic at the store's entrance hall where the service terminal was positioned. Sensor implementation is described in more detail in [47].

The purpose of the implementation of depth sensor tracking was to better understand the in-store customer behavior, and to gather in more detail data of 1) the number of customers using the service terminal, and 2) the duration of the service use. The data was recorded during a total of 64 days. Most of those days contain tracking information from all the hours the store was open. Some



hours are missing due to the instability of the people-tracking software. From the recorded data all those store customers that came to the near-range of the service set-up were analyzed. The real-world position of the customers using the service terminal was mapped to the people-tracker coordinates and all the customers that had come into a 30 cm radius of the user position and stayed still more than three seconds were accepted. The radius from the user position was kept relatively small in order to minimize the distortion of data resulting from confusing the users of the slot machine as service terminal users.

The results show that most of the users used the service for a relatively short time. On average 0.54 store customers per hour used the service terminal. It is reasonable to assume that, most likely, a proper usage of the service system would take more than 120 seconds. The shorter the usage period, the less serious or determined the user session has been. Average usage period was 58.4 seconds. Thus, the service usage appeared as quite short-term, indicating that in most cases the service usage was not so "goal-directed", but more like sessions where store customers briefly familiarized themselves with the novel service. During the hours the store was open, from 7am to 9pm, there were on average 7.56 service users/day. For the week, Saturday and Sunday attracted the most service users and the times of most service users were at 1-2pm and 6-7pm.

#### 4.1.2. Store Personnel

The goal of the group interviews was to investigate store personnel attitudes and expectations towards the novel service concept, and ideas for service improvement and further development. In addition, the store superior was contacted every other week with a phone call for the purpose of enquiring about the in-store service experiences, both from the viewpoint of the store customers and personnel.

**Group interviews and phone calls.** Two group interviews with six members of the store personnel were carried out at the same time as the personnel were introduced and familiarized with the service concept, alongside their new service-related work tasks. In general, the attitudes of the store personnel towards the novel service appeared as enthusiastic and positive.

Naturally, the novel service also invoked some doubts, mostly related to its employing effect on the personnel, the clearness and learnability of the order processes, and formation of the new routines related to the service adoption that would also streamline their new work duties, and thus ease their work load.

In addition, the following comments illustrate the general thoughts of the store personnel and expectations regarding the service:

*"This is [indeed a useful service], since we have these long distances [to bigger cities].  
Now a customer can buy the washing machine from us."  
"Always the adding of more services should be a positive thing."  
"More services also always mean more customers."  
"When we get our own routines and set-up for this, I'm certain this will succeed!"  
"...Should have distribution of [personnel's] work with this."*

During the first two months of the case study, inquiry calls were made every two weeks to the store superior in order to keep records and obtain information regarding the progress of the service adoption at the store, in addition to possible encountered problems from the viewpoint of both the customers and the personnel. In general, the novel retail service appeared to have been quickly well-integrated into the personnel's work processes.

#### 4.2 Results of Case Study B

The target group of the Case Study B included a working-age population. Together 17 people were interviewed (8 women and 9 men). Age distribution varied between 27 and 63 years. Most of the interviewees (88%) lived in the Helsinki metropolitan area. Over half of the interviewees (62%) commonly used the retailer's stores to buy daily consumer goods. The most remarkable factor affecting selection of the store was location. Also, selection of goods, quality of the products, price level, bonus system and other services besides the store location were important criteria for consumer choice of which store to go to.

Consumers are mainly confident with the selection of goods in retailer's stores. According to the customers, it is usually easy to find the different products in smaller and familiar stores. In unfamiliar bigger hypermarkets it is sometimes a real challenge. If some product is not available in the store, the customer usually goes to some other store to buy it. Most of the interviewees (71%) also shop online, an average of 1-2 times in a month, and they usually buy clothes and electronics. Online shopping is liked mainly because of cheaper prices, wider selection of consumer goods and it is easy and fast.

Generally, customers (88%) liked the idea of novel digital service points in the Prisma stores. They felt that the customer displays sped up getting the useful information and made shopping in the stores more effective. According to the interviewees, the most important services were the map service and product information. Especially in bigger hypermarkets, and if the customers are not familiar with

the store, it is sometimes challenging to find certain products. The map service could include additional information about the location of the department and the shelf where the product can be found. In the hypermarkets there usually are limited possibilities to offer detailed information about the products. With this novel digital service customers are willing to get more information about the products and compare them.

A proof of concept version of the novel user interface received positive feedback; customers thought it was clear, simple and easy to use. They also felt that it was something new and different, compared to traditional web sites. It was pointed out that there is too much content e.g., in Prisma's web store to be flipped through in the hypermarket. It is important to keep the content and layout of the novel user interface simple.

People are more willing to do online shopping at home. Online shopping in the store was still not totally refused, and interviewees found several circumstances when they could utilize it. For example, it could be easy to do online shopping at the same time with other shopping in Prisma stores. If some certain product is no longer available in the store, customers could buy it online in the store, especially the sale products.

According to the customers there should be several digital service points in Prisma stores, customers are not willing to queue up for their own turn. The service points should be located next to the entrance and also in the departments, next to the consumer goods. The service point should be a peaceful place where they have enough privacy to concentrate on finding information and shopping. Still, there should be something interesting on the screen, something that attracts the customers. The youngest interviewees commented that they would like to go to test the new device and find out what it is, whereas the eldest interviewees said that they would like to know beforehand what they could get from the new service. The screen has to be big enough and good quality. Interviewees thought that the touch screen was modern. Using a tablet as a screen in a digital service point was seen to be too small.

In addition, the retailer got some new ideas for developing customer service in the stores. For example, some of the interviewees suggested a mobile application for customer service and map service, and it could also be used as a news channel. Customers could also create personalized shopping lists with it. Authentication to the digital service point could be executed by fidelity cards in order to receive personalized news and advertisements and to accelerate the service.

## 5. Conclusions

Today the Internet and digital technologies are becoming more and more integrated across all sectors of our economy and society. Digitalization is everywhere; it is changing the world and our everyday lives. Digital services provide new services or enhanced services to customers and end users. In a DIGILE Digital Services program, 85 Finnish partners innovated and developed novel digital services in 2012-2015 by recognizing the need of enablers in their context. Work was conducted in a true partnership model, in close co-operation with research organizations and companies. During the whole program, ecosystem thinking had a big role in innovating and developing the solutions. The program exceeded the goals by achieving 27 highlighted new services and 18 features. In addition, three new companies were established as a result of ecosystem thinking and companies shared and innovated together new or enhanced digital services.

In many cases in the DS program the role of consumers and stakeholders was remarkable in the development process. Narratives, illustrations and prototypes enhanced the co-development of new solutions from ideas through trials and evaluations to working prototypes. There is a wide scale of tools, methods and knowledge available for demonstrating ideas and opportunities enabled by emerging technologies, and for facilitating co-innovation processes. In this program, novel game-like tools were developed to easily involve different groups of people in the development process. The tools support efficient and agile development and evaluation for identifying viable concepts in collaboration between experts and users.

In this paper, two retail case studies were presented in detail. Case Study A was conducted in the context of developing and piloting a novel omnichannel service concept in distant rural store. Case Study B concentrated on novel digital service points in hypermarkets. The need for these kinds of novel digital services have different starting points; in the city of Kolari the selection of goods in the local store is limited and the distance to bigger cities and stores is long. In the Helsinki area, the selection of stores and goods is huge and people are also more experienced in shopping online. Still, in both cases, people expect more quality customer service, e.g., in terms of value added shopping experience, easier shopping and wider selection of goods. In both case studies customers stated they were likely to use the novel digital retail services in the future. The behavior of the consumer has changed due to digitalization and this change must be taken into consideration when developing services for the customers.

Integrating novel digitally-enabled retail services with a physical store requires innovative thinking from retailers. Customers are interested in having these types of novel digital services in the stores; they feel them to be modern and forward-looking options. Most of the customers see that the digital service points make shopping more effective and they expect that they will get useful information faster compared to current situation in the hypermarkets.

These retail-related case studies were implemented in order to better understand the challenges and opportunities in this domain. Based on these studies the most important issues for retailers to take into account when implementing digital services in the stores are:

- Keep it simple. Keeping the layout and user interface clear and easy makes it possible to serve all the user groups digitally.
- Central location. Digital service points should be situated in noticeable positions in the stores. Customers do not want to search for the service points or queue up for using the service. Enlarging and clarifying the instructional and information texts is part of this issue. Also, elements in the graphical user interface must be considered carefully to arouse customer interest when they are passing by.
- Adding more privacy. Despite the central location privacy issues have to be taken into consideration when implementing the digital service point in the store. The service points should offer an undisturbed place for searching information and shopping.
- High quality screens. Customers are nowadays experienced with using different kinds of screens. A touch screen was felt to be modern. The screens have to be high quality to ensure the smoothness of interaction between the customer and the service terminal user interface.
- Going mobile. Customers were also asking for mobile services enclosed in this novel digital service. This could bring the retailers an unlimited amount of possibilities to offer their services also outside the stores.

Digital service points are one option to offer digital services for retail customers. Still others, e.g., mobile services, have unlimited possibilities to create added value for the customers. In this type of development work, when something new is developed for the consumer, it is essential to involve real customers in the beginning of the planning and developing process. Customers are the best experts in user experience. In this study consumers were bravely involved in the very early stage to co-innovate and

co-develop the retail services. It is noticed that active user involvement in the early stage of a development process increases the quality of the novel service, and user involvement leads to better user acceptance and commitment.

As introduced in this paper, user involvement and co-design have a central and very important role when developing novel digital services for customers. In fact, feedback and opinions of end users can significantly improve or change the final results. The DS program facilitated the development of novel digital services by providing an ecosystem where companies could share and pilot their innovations. This kind of ecosystem thinking was seen in a very useful and productive manner.

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