Tomi Niemi

The Affordances of the Digital Medium

Users' perceptions of digitalization

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Tiivistelmä

Tämän hallintotieteellisen tutkimuksen tavoitteena on digitalisaation ja digitaalisten palvelujen hyödyntämiseen liittyvien mahdollisuuksien ja estävien tekijöiden tunnistaminen. Käsiteltävän aiheen tarkastelu noudattaa käyttäjälähtöistä lähestymistapaa, joka toteutettiin yhteiskehittämisen menetelmää hyödyntämällä. Tutkimuksen aineisto kerättiin Suomen maaseutupaikkakunnilta sekä terveydenhuollon organisaatioympäristöstä osallistujien välisistä ryhmäkeskusteluista. Affordanssiteoria yhdessä digitalisaatiotematiikan sekä yhteiskehittämisen lähestymistavan kanssa muodostavat tutkimuksen teoreettisen viitekehyksen, joka tarjoaa tarkastelunäkökulman käyttäjän ja ympäristön välisen vuorovaikutussuhteen tulkitsemiseksi. Tutkimuksen teoreettisen viitekehyksen kautta väitöskirja vastaa tutkimuskysymykseen, mikä merkitys affordanssiteorialla on digitalisaation hyödyntämiselle.

Tutkimuksen tulokset ilmentävät kansalaisten näkemyksiä digitalisaatiosta ja sähköisistä palveluista. Osallistujien suhtautuminen digitalisaatiota kohtaan kuvataan käyttäjien, ympäristön ja digitaalisten sovellusten näkökulmista. Tutkimuksessa esiteltävä osallistavan deliberatiivisen suunnittelun (participatory-deliberative design) malli mahdollistaa aiheeseen sisältyvien moniulotteisten näkemysten esiin nostamisen.

Johtopäätöksenä voidaan todeta, että affordanssiteorian näkökulma auttaa ymmärtämään niitä tekijöitä, jotka mahdollistavat tai estävät digitalisaatioon liittyvät oivallukset. Affordanssien, eli ns. tarjoumien muodostumista kuvaava kognitiivinen prosessi tarjoaa lisääntyneen oivaltamisen mahdollisuuden sekä havainnoijalle itselleen, mutta myös kehittämisyhteisön hyödynnettäväksi. Kaiken kaikkiaan lisääntynyt tietoisuus ympäristön mahdollisuuksista tarjoaa mahdollisuuden ymmärtää muiden näkökulmia tarkasteltavaan aiheeseen ja selittää ajattelun taustalla vaikuttavia syitä. Tutkimuksen vaikutukset ovat hyödynnettävissä niin odottamattomissa tapahtumissa, kuten COVID-19 pandemian myötä tapahtunut "digiloikka" osoittaa. Tutkimuksen näkökulma on myös sovellettavissa paljon yleisempiin tilanteisiin, kuten esimerkiksi hyvinvointipalvelujen digitalisoinnin tarkasteluun.

Asiasanat: Digitalisaatio, affordanssiteoria, yhteiskehittäminen, organisaatiotutkimus, palvelumuotoilu, osallistava suunnittelu, deliberatiivinen demokratia

Abstract

The aim of this administrative research is to identify the opportunities and obstacles associated with the exploitation of digitalization and digital services. The objective of the study is viewed from a user perspective, undertaken using a co-creation approach. The research material was collected in group discussions between participants in rural areas in Finland, as well as from the organizational environment of Finnish health care. Affordance theory, together with the concepts of the digital medium, and the co-creation of digitalization provide a theoretical framework for the research. The affordance approach provides a perspective to interpret the relationship between the user and the environment, where the aspects of the digital medium and the forming of the collective perception are also considered. By the theoretical framework, this doctoral dissertation responds to the following research question: what is the meaning of affordance theory for the utilization of the digital medium?

The results of my study reflect citizens' views on digitalization and e-services. The participants' attitude towards digitalization is described from the perspective of users, the environment, and digital applications. The model of participatory-deliberative design presented in the study enabled the multidimensional views of the topic.

In conclusion, the perspective derived from affordance theory helps us to understand the factors that enable or prevent the utilization of the digital medium. However, the description also opens the cognitive process to the observer itself and to the development community. The increased self-awareness about one's insights enables the user to be more flexible in controlling how to utilize the opportunities in the environment. Overall, increased awareness of the potential of the environment offers an opportunity to understand the views of others on the subject under consideration and to explain the underlying perception. The additional aspects of design and co-creation of the digital affordances support the successful discovery and implementation of the possibilities. The contribution of this research becomes apparent in unexpected events, as the increased digital transformation during the COVID-19 pandemic demonstrates. The results also contribute to much more common surroundings and situations, as in the case of digitalization of welfare services.

Keywords: Digitalization, affordance theory, co-creation, organizational research, service design, participatory design, deliberative democracy

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Contents

Figures

Tables

1   INTRODUCTION

Digitalization, as in digital transformation, has been acknowledged to progress and influence societies, jobs, and finance markets as well as people in multiple ways (Henriette, Feki & Boughzala 2015). The phenomenon has been recognized by multiple researchers and institutions for decades already, as Negroponte (1995) and Castells (2010; 2002) demonstrate. Despite its pervasive influence, the phenomenon still appears as something rather vague and highly subjective (see Alter 2010). The phenomenon continues to evolve as technology develops and societies and user groups utilize the potential of digital technology as times change. In its continuing development, the ongoing digitalization presents a double-edged aspect as the solution for change management but also as the reason for the change. Its advantages and controversial effects have been identified by multiple researchers, (Kim, Andersen & Lee 2022; Ylinen 2021; Syväjärvi et al. 2015; Croon Fors 2010;).

Governments and administrative institutions have attached themselves to the idea of digitalization by announcing variety of reform strategies in their mission to take advantage of the increasingly digitalized world, like the European Commission's Digital Europe Programme and Finland's Ministry of Finance has also stated the importance of digital development (European Commission 2022; Ministry of Finance 2021). The adoption of the concept appears to be a highly desired and required development path, which the current unfortunate global crisis of the COVID-19 pandemic has highlighted further (Amankwah-Amoah, Khan, Wood and Knight 2021). The public sector is acting at the forefront of societal changes and faces the demand of utilizing intelligent means for the better organization of its services, as Stenvall and Virtanen (2017) point out. To achieve this goal, researchers like Greve (2015), Ylinen (2021) and Schedler, Guenduez and Frischknecht (2019) have suggested digitalization options to improve public sector efficacy.

Public management is already advancing into the digital era, as Dunleavy et al (2005) state. Digital transformation is changing its surroundings by demanding new practices and providing new means for management systems, as well as new methods for interacting with citizens and civil society (Dunleavy et al. 2005: 467–469). Kim, Andersen, and Lee (2022) reinforce this assessment as they present how current technological development is steering the administrative activities ever more strongly to digital platforms. Digital developments can be represented under the umbrella term of smart technology (see chapter 2.4.2), which has evolved to the extent that public management *needs* to digitalize its services and

operations (Kim, Andersen, & Lee 2022: 362–363). Similarly, Syväjärvi et al (2015) pointed out how smart information and communication technology (ICT) is being appreciated as a city-wide objective, and how digital technology advances are delivering desired capital to the organization of local services and processes.

The presence and requirement of the digital transformation among public sector activities becomes apparent in the vast scope of research in the field of public administration and management (see Kaivo-oja et al. 2022; Koskimies et al. 2022; Breit etl al. 2020; Sobrino-García 2021; Ylinen 2021; Schedler, Guenduez & Frischknecht 2019; Sundberg 2019; Syväjärvi et al. 2015; Alford & Hughes 2008; Welp, Urgell & Aibar 2007; Dunleavy et al. 2005). Its undeniable presence emphasizes the meaning and value of the evolving digital means for the public sector and to the organization and delivery of its services. Despite the vast number of studies already directed to the topic of digital transformation, additional research is still essential. As Kaivo-oja et al (2022) explained, the phenomenon is in a constant and fast progressing state of evolution, requiring continuous research and innovations for the public sector to keep up with the changes and demands that result. The current study seeks to address the topic of digital media, expressing the wide range of perspectives related to the nature and utilization of the concept. As ambiguous as the nature of digitalization appears (see Chapter 2.3), the feature itself justifies and validates the importance of further studying the topic and its utilization.

This research aims to address the potential of, and the inhibiting factors that relate to, the utilization of digitalization and digital services. The objective of the study is viewed from a user perspective.

The integration of digital means presents challenges in the provision of user-appreciated services, which highlights the requirement for a user-centered view in the development and integration of the solutions. The user-centered view is in many cases approached from the co-creation perspective, as seen with Rodriquez Muller et al (2021). Similarly, Rösler et al (2021) emphasize the meaning of and opportunities presented by co-creation for the integration of digital transformation in public sector practices. Likewise, Edelmann & Mergel (2021), who engaged the stakeholders of the Austrian public sector in co-creation of digital public administration, highlight the value of participation for the service design. Kirjavainen and Jalonen (2022) show in the Finnish context how digital means can function as the supporting means for co-creation as well as the target of co-creation. Despite its indisputable detriments, the co-creation approach presents a promising way to make the domain-relevant opinions apparent, as Kirjavainen and Jalonen (2022: 25–27) and the other aforementioned studies make clear.

Osborne et al (2021a) remark on how the co-creation approach enables an important opportunity for mutual value creation in the processes of public service delivery. In co-creation, the topic-relevant members act in common collaboration to provide their input for the service process. The viewpoint brings service users, citizens and service providers into mutual interaction that engages the user as a member of the development team. The involvement emphasizes the meaning of user-based knowledge and opinions within the design of services. Co-creation enables the recognition of individual views and insights in mutual collaboration (Osborne et al. 2021a; Torfing, Sørensen & Røiseland 2017).

Despite the positivist introduction of co-creation, the process also involves certain threats that can distort the whole process, as Jalonen, Puustinen and Raisio (2020) remind us in their approach to the dark side of co-creation (see Chapter 3.4). Researchers Raisio, Puustinen and Valtonen (2021: 279) support this perspective, as they highlight how interest in participation and willingness to influence may be affected by multiple prejudices and mistrust toward the process. The possible negative impacts were taken into consideration when arranging the research projects, and the study applied the co-creation aspect to data gathering in the empirical phase of the research (see Chapter 4.2). The co-creation comprises collaborative teamwork, following a synthesis of the methods of participatory design and the principles of deliberative democracy (see Chapter 4). The research methodological approach is introduced as the concept of participatory-deliberative design.

Highlighting the user-centered design approach, this study adopts the theory of affordances as the theoretical framework to build awareness and understanding about the user-related views on the utilization of digitalization opportunities.

Affordance theory represents a psychological approach to understanding a person and his/her view of the ambient surroundings. The theory was introduced in 1977 by the ecological psychologist J. J. Gibson, whose approach has since been adopted in multiple different fields and disciplines, from psychology, to information systems, to cognitive and organizational studies (Chong & Proctor 2020; Hauge 2018; Anderson & Robey 2017; Hellström & Jacob 2017; Orlikowski & Scott 2008; Norman 1988). The theory of affordances provides a meaningful way to understand the user's perspective by taking a holistic approach to assessing the user's abilities and the qualities of the environment. It is an approach that is critical to the use of technology and design of computer interaction, as Gaver (1991) noted from the perspective of the computer studies field. The theory of affordances reflects the surrounding opportunities or inhibiting factors as the observer witnesses them in their environment, as Gibson (2015: 118) stated:

> *"The world is specified in the structure of the light that reaches us, but it is entirely up to us to perceive it."*

Despite the comprehensive spread of the affordance theory approach to different disciplines, in the Finnish context the approach demonstrates a recognizable research gap within administrative sciences. The current Finnish studies, such as Koivisto ym (2022), Vaahensalo (2021), Salonen, Kannasto and Paatelainen (2021), Rantakokko & Nuopponen (2019), as well as Arminen & Raudaskoski (2003), represent very narrow results in Finnish research utilizing the affordance theory perspective, addressing the research areas of sociology, communication, information research and gerontology. For example, the Ministry of Education and Culture -funded Finna (Finna.fi) open-source search service, which harvests search-specific results from Finnish archives, libraries and museums, returns only 43 results for the search term "affordances" among doctoral dissertations. The dissertation findings represent disciplines from arts, to music, to technology, social science, and education, but do not include administrative sciences. Examples of published doctoral dissertations utilizing the affordance perspective are introduced in chapter 6.1., as the chapter presents the value of the dissertation.

The lack of affordance theory perspective within the administrative sciences and the importance of researching digitalization justifies this dissertation's research approach and explains the contribution it will make to the field. Due to the complexity of the presented topics, it is worth introducing the dissertation's theme across its diverse dimensions. The following Chapter 1.1 introduces the approaches and concepts involved, which will become familiar throughout the study as they comprise the research setting presented in the research framework triangle (Figure 2).

1.1   The theme of this study

As stated, the evolving digitalization presents itself as an enormous topic, possessing various related concepts that branch out from the main technology orientation. The full spectrum of the concept is so great that it is worth taking some time to understand the aim of utilizing digitalization. In the pursue of a holistic utilization, understanding digital transformation urges an investigation of the meaning of the medium, as well as the user's perception concerning its potential and the opportunities afforded by it. The comprehensive view directs the focus not only on the digital medium but also on the people and user groups taking advantage of digital artifacts and solutions.

The theoretical section of the study introduces the topics of the digital medium and affordance theory that enable us to understand the subjective view of digitalization. The participatory-deliberative design is the chosen method for the co-creation and development of digital opportunities. The considered concepts feature multiple dimensions and are interconnected, with features that open even more concepts and domain-related terminology. To provide a preliminary clarity about the concepts addressed, the current chapter reveals the meaning of the concepts used and presents their interconnection. The research framework specifies the intention of the study in Chapter 1.2 Research aim and questions. The latter part of the current chapter is divided into three sections that structure the narrative and relate to the concepts in the dissertation. These sections are *the holisticity of the digital medium*, *people at the core of digital development,* and *the co-creation of digital design.*

The holisticity of the digital medium

Reality as we experience it nowadays is much affected by the interference of the artificial, as Simon (1996: 2) explains: "The natural world we live in today is more a man-made, or artificial, world than it is a natural world". The artificial, as in engineered or crafted or otherwise human-produced object, cannot be neglected within the modern environment. Simon (1996: 2–3) further explains that the artificial surrounds and contains us in more than just a few ways. The environment in which we spend our time is usually artificially adjusted to our desired temperature; the actions we take are transmitted to other people through the manmade artifacts that relay speech and text; and artificial artifacts can defy the conditions of humans' natural environment—like aircraft allowing human beings to fly, submarines allowing people to live underwater, and digital surroundings allowing people to meet without sharing their physical presence. Digitalization is all around us.

Haenlein and Kaplan (2019) describe how the time in which we live feels like a wonderland, and refer to the computing opportunities that have turned our environment into something scarcely imaginable just a few decades ago. We encounter self-driving cars, image recognition where the capabilities of a computer can exceed the skills of physician, and collaborations with machines able to meet our cognitive, emotional, and social intelligence levels, as AI has developed to such an extent that it has been able to catch up with humans. We are on the way to the metaverse future, where people can live their lives in physical isolation as they socialize, experience and live in a virtual reality through their three-dimensional avatars.

With future technologies, reality will be heavily distorted. Mark Zuckerberg, the founder of Facebook, has said that virtual reality, into which he is taking his social

media platform, is going to be "the next platform" for computing. A 2020 article in The Economist described how this Metaverse, which took its name from the 1992 novel "Snow Crash" written by Neal Stephenson, hosted American rap artist Travis Scott, who performed to an audience as a virtual avatar. The artist performed for 12 million other avatars, who followed his performance and interacted with their idol in the Metaverse via the video game Fortnite. Past predictions are coming true, as we witness the digital medium developing and affecting all areas of human interaction.

Even though the metaverse and ubiquitous computing are reaching people everywhere, and the advances of AI and the Internet of Things are becoming more pronounced in our everyday lives as technologies provide digitalization opportunities (Thompson 2011: 60–61), the reality remains that not everyone accepts current developments (Dodig-Crnkovic 2013: 326). The societal revolution resulting from ICT that has brought instantaneous communication and diminished the border between people's online and offline lives has at the same time placed a strain on people's cognitive resources. As a result, online platforms and reality are merging into one space, where people interact and enact longstanding behaviors in new ways. Dodig-Crnkovic (2013: 326) concludes by arguing that the resultant cognitive revolution successfully creates a situation where:

> *"Information constitutes our new ecology* […] *in which ubiquitous computing facilities are changing our interactions with the world and the character of our relationships with other people."*

The shift produces a fundamental change that not only requires people to act differently but also discover the ability to think differently. As the distinction between the offline and online worlds disappears and the Metaverse future approaches, we stand on the threshold of the era of Internet 2.0. A technological future some novelists have described as dystopian beckons. The future offers both marvellous possibilities and unknown challenges, which require, as Thornhill (2021) stated, careful consideration from people who must choose in which Metaverse they wish to live.

It quickly becomes clear that digital transformation offers assets for development and, as Nieminen (2016: 20–22) argued, digitalized information and communication technology has become so immersive that its reach can and should be utilized for the sake of development. But, as with any development, the utilization of digitalization also requires a thoughtful and holistic approach that considers the reach and integration of the digital implementation.

People at the core of digital development

Borrowing from the natural sciences, the idea of the 'ecosystem' also provides structure and clarity for the digital realm (Adner 2017: 39–40). Without a clear structure, the digital experience can produce an undesired confusion in the customer (Bolton, McColl-Kennedy, Chaung, Gallan, Orsingher, Witell and Zaki 2018). The appearance and adoption of digital technologies such as artificial intelligence, virtual reality, wearable technologies, business process automation and machine-to-machine interaction through the Internet of Things can facilitate an environment that provides a fluent interaction and exchange of information between organization members and customers. However, the density of information content and the number of peripherals communicating with each other and mining data have become increasingly vast and complex, causing the digital realm to require a structure for better understanding (Bolton et al. 2018: 779–780).

The digital ecosystem concept familiarizes users with the digital technology sphere by creating a structural platform to understand the nature, features and different variables that are included in the use and function of the digital era's opportunities. Along with Darking et al (2008), Hadzic and Chang (2010: 779) use the biological analogue to determine the definition of 'ecosystem' within the digital environment. Like a biological ecosystem composed of various interrelated biological species, Hadiz and Chang (2010: 779) define the digital ecosystem as being

> *"composed of* [a] *variety of interrelated digital species that interact with each other and with their digital environment."*

As Hadzic and Chang (2010: 779) suggest, the digital environment gathers together the different digital artifacts that comprise the structure that shapes the hardware along with the software functionalities. This is what makes up the digital ecosystem. Within the digital ecosystem, the hardware and software solutions function in, and in collaboration with, the environment. The definition expands in different directions, resulting in specializations like digital business ecosystem (Darking et al. 2008) and digital service ecosystem (Immonen, Ovaska, Kalaoja and Pakkala 2016), in which the digital environment with its artifacts integrates with the sphere of service delivery. Immonen et al (2016: 151) describe the digital service ecosystem as "a kind of self-organized environment that addresses openness and dynamicity, enabling collaborative innovation and co-creation among ecosystem members".

Corrigan and Miller (2011) bring the user-centered approach to their view of the digital ecosystem, as the user experience can be considered as the core of the whole end-user interaction. The user-centered approach fits well with digital ecosystem

thinking (see. Immonen et al 2016), as the interaction depends on multiple user-driven factors like usability, accessibility, quality, communication, emotional triggers, and workflow, as Corrigan and Miller (2011: 13) depicted (see Figure 1).
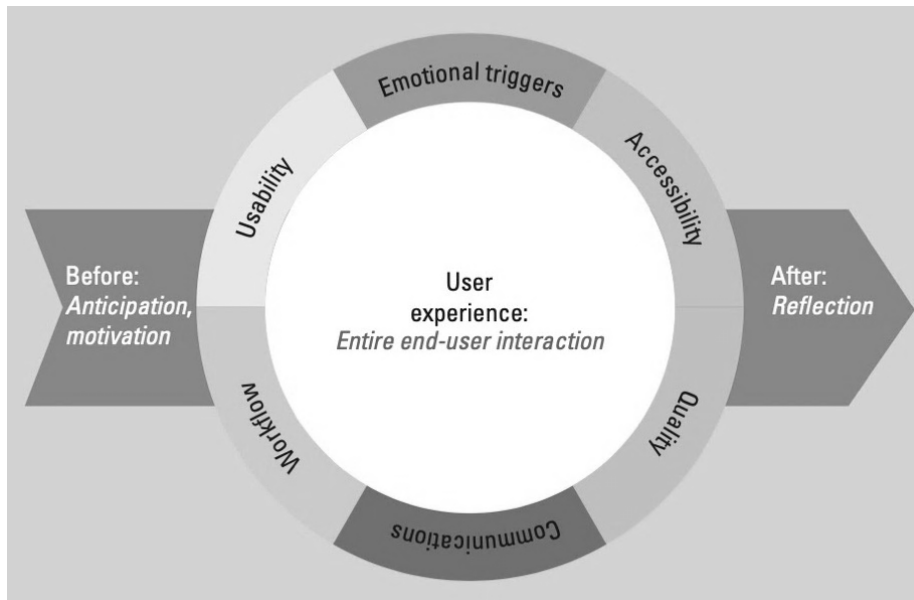
Figure 1.   User experience (Corrigan & Miller 2011: 13)

Following Corrigan and Miller (2011), the end-user should be placed at the core of the digital service and artifact development, as the end-user ultimately defines their willingness to participate in, and acceptance of, the digital interaction. Continuing with the ecosystem analogue, Immonen et al (2016: 153) remind us that the digital service ecosystem exists as a part of a service ecosystem that is a complex socio-technical system that aims to share goals with and gain added value from the collaboration between its members. In addition, Valkokari, Seppänen, Mäntylä and Jylhä-Ollila (2017) show how the characteristics of the ecosystem support the aim of innovation within it. In the objectives of a functional service ecosystem, user perspectives need to be addressed individually (as the user-centered design suggests) but also as a whole, as they are when considering the full-service ecosystem. Affordance theory provides a means for understanding and revealing the user-related insights regarding and perceptions of the use of the technologies in their surroundings. As Anderson and Robey (2017: 101) state,

> "Affordance theory offers a promising perspective on IT-enabled change by focusing attention on aspects of the relationship between an IT artifact and its users."

The co-creation of digital design

Collaboration introduces the possibility of co-creation for the development of service delivery. Voorberg, Bekkers, Timeus, Tonurist and Tummers (2017: 179) describe co-creation as "the involvement of citizens in the initiation and/or the design process of public services in order to (co)create beneficial outcomes". The process of co-creation thus involves the issue-related stakeholders in the collaborative development. Stakeholder involvement enables the broader utilization of resources and competences for the designing or redesigning of service delivery. The approach offers alternative ways to address difficult problems, where new resources of knowledge, information and experiences can act as key insights for overcoming existing problems, as described by Voorberg et al (2017: 178–179).

The aims of co-creation include accepting change and balancing control, as the approach requires the ability to work together, across the boundaries and borders that separate and distinguish experiences, resources, and ideas (Torfing, Sørensen and Røiseland 2016: 6). In turn, the co-creation process enables the customers, citizens, and service users to become empowered members of the service-designing team and thus provide important voices to the decision-making participants. The effect causes a shift in power in which the experts become facilitators and new learning is acquired on all sides of the collaboration. Voorberg et al (2017: 178–180) go on to explain how the consideration of the user perspective must be fundamental to the process and emphasize the need for willingness and engagement for co-creation for all the parties. Unleashing co-creation can reveal organizational creativity and innovation that provides desired growth, success and achievement of performance aims (Mumford, Hester & Robledo 2012: 3–4; Nijstad & De Dreu 2002: 400–401; West 2002: 355–357).

The aim of creating solutions that are of high quality, original and elegance, as Mumford et al (2012: 4) put it, involves the presence of cognitive input, either from an individual or a group that produces task-associated ideas and solutions. Despite idea creation requiring commitment, different types of thinking from convergent to divergent, and the exchange of information among multiple people, the aim remains to produce solutions that serve the organizational intentions that ultimately center the users' requirements (Mumford et al. 2012: 3–5). Chammas, Quaresma and Mont' Alvão (2015: 5399) confirm how the user's involvement should be valued within a development process and show how the engagement needs to be appreciated throughout the process to explore the user insights toward the use or anticipated use of a product, system or service. The user-centered design approach finds the features that promote the usefulness, ease of use and the attribute of fun associated with the utilization of an organizational outcome, or of a product,

service delivery or interaction. Borrowing from Chammas et al (2015: 5399), the desired user experience can consist of "affections, emotions, beliefs, and expectations that occur before, during and after the use of the product", which presents a list of attributes on which the user-centered development should be targeted.

Considering the utilization of ICT and all the advances that have come with digital transformation, its functionality and usability aspects deserve a prioritized position within its considerations. Bødker (2016) demonstrates at length how technological advances have reached a point where digital functionalities can disturb the boundaries of work and life, as digitalization mediates both realms seamlessly regardless of the physical space in which we happen to be. Technologies have successfully developed to include multiple functionalities within a single artifact. According to Maceli and Atwood (2011: 98–100), the use cases for previously single-use artifacts have skyrocketed and now multiple professionals can utilize the same tool for diverse specialized needs. More than a decade ago, Yoo (2010a) discussed how the emergence of ubiquitous computing and the introduction of the iPhone changed the how technology affects us daily by bridging the phone's hardware capabilities with the Internet-provided software opportunities, creating expanded opportunities for the customer to customize the functionality and usability of their mobile device.

The embeddedness of the computing capabilities creates a realm of possibilities that can provide an endless amount of new experiences (Yoo 2010a: 216), much like the still relatively unknown concept of the metaverse described in earlier paragraphs (see Thornhill 2021; Haenlain & Kaplan 2019; Thompson 2011). The growing functionality and connectivity of devices and networks is widening the reach of the digital artifacts and expanding the whole ecosystem (Bødker 2016; Maceli & Atwood 2011). This broadening ecology of artifacts further expands the way in which the artifacts can be perceived: Bødker and Klokmose (2012) refer to the expanding interconnectedness between artifacts and people, borrowing the thought from Gibson (1979).

The diversity of different technological artifacts, functionalities, use cases and personal desires regarding the technologies result in a complex array of variables. The variables are present in the digital transformation, as the technological advances are meant to be adopted for use, integrated into organizational processes, and used for entertainment and leisure purposes (Norman 2013: 4–7). The digital medium provides all these things and more as it continues to develop, but as Norman (2004) reminds in his article about beauty, goodness, and usability, all things are subjectively perceived and experienced, which ultimately leads to individual interpretations of the aesthetics, usability, and functionalities of digital artifacts.

The consideration of the subjective perception in terms of affordance theory reminds us of the existing diverse perceptions present in the environment, as Stoffregen (2003) presents. The affordance approach helps us to interpret the environment's possibilities and restrictions as they become apparent to people observing the elements and features within their surroundings. Acknowledging the features of the observer-environment system supports the recognition of the objects' diverse functionalities and different use cases, which Norman (2013) identified as a core characteristic of the design of the artificial environment. This present research investigates the meaning of the digital medium by using affordance theory as an approach that ties together the digital object, the surroundings and the observer (see Figure 2).

1.2 Research aim and questions

Digitalization presents a highly subjective, actively developing environment that simultaneously provides real opportunities while challenging its users' perceptions about its nature and dimensions. The prevailing uncertainty questions the functionality of the digitally-provided services and goods, which requires an accurate understanding of the user to be incorporated within the design of things. The user subjectively viewing the digital services, digitally provided products or digital operating systems is the key to good service development. The affordance perspective on digitalization provides the factors to create a deep understanding of the user's perception, facilitating both an understanding of the user's perspective and the liberation of creative potential that an unrestricted view enables.

Following the research aim of detecting the opportunities and restrictions of digitalization, the dissertation introduces an approach for the development of digital artifacts and solutions. The research approach incorporates the digital environment, the user perception, and the co-creation of ideas within a single framework. The research framework triangle (Figure 2) consists of the following factors: *the digital medium*, *the affordance perspective*, and *the co-creation of digitalization,* as introduced below. The interrelated factors in the digital development process are described theoretically in this study as well as being tested empirically through the methodological approach. The research framework triangle functions as an introduction to the meaning of this study as well as presenting its key concepts and their interrelation. The use and meaning of the triangle directs attention to utilizing the opportunities, recognizing the challenges and inhibiting factors, and understanding the user perspective when adapting and integrating developing digital technologies into work and leisure activities.
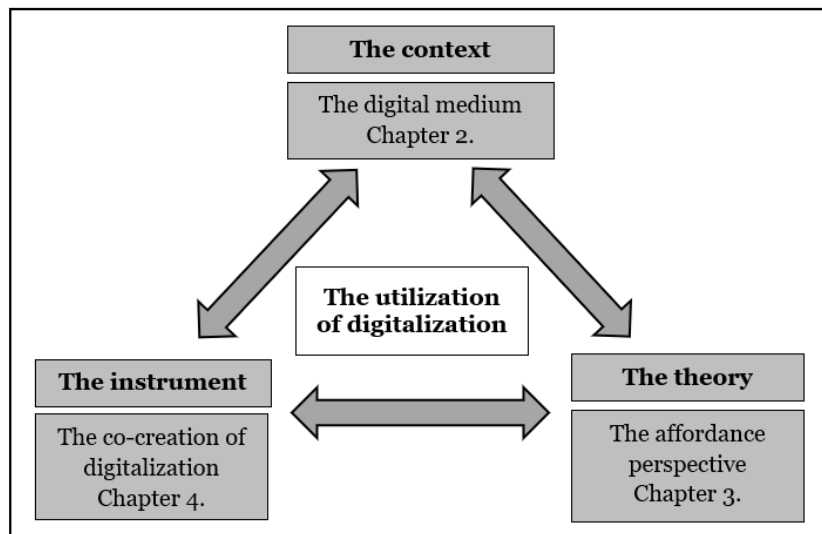
Figure 2.   The research framework triangle.

This intention is in line with the exploitation of digitalization, as Ashwell (2017: 393–394) put it. The three factors of data, digital technology and people create the structure of digital transformation, and are addressed by the research framework triangle. The results become apparent through the participatory nature of co-creation and through the user-centered approach that the affordance perspective supports. In addition, with the aim and meaning of digitalization. The digital medium thus appears as the source of perception and idea creation but also as the target of development, acting simultaneously as a platform for development as well as its source and purpose. The co-creation of digitalization includes the aspect of collaborative development through the concept of participatory-deliberative design, as it emphasizes the meaning and importance of differing views, as opinions, expertise, and experiences, for the development. The co-creation of digitally enabled solutions brings the benefit of different perspectives and requirements into idea creation, which helps to produce the needed novelties. Each of the framework factors have their unique qualities that are in a mutual and reciprocal relation with each other, as illustrated in Figure 2.

This research targets the opportunities and inhibiting factors affecting the digitalization of artifacts, services, and solutions, with the intention of viewing them from the user perspective. The aim of the study is covered by three research questions that together comprise the main objective of the research.

1. What is the meaning of affordance theory for the utilization of the digital medium?

   a. What are the insights associated with the utilization of the digital medium?

   b. What are the user-related perspectives that require consideration regarding the exploitation of the digital medium?

   c. What does the co-creation approach add to the utilization of affordance theory?

The empirical part of the study approaches citizens and organization members in their familiar surroundings and asks about their perception of digitalization. As the research participants express their views, wants, requirements and opinions for developmental suggestions, the analysis reveals the users' views about the opportunities and attributes of digitalization. In the empirical analysis the research and development projects provide the users' perception from within the Finnish context, and from a university hospital's point of view. The research findings are derived from a group dialog between the people participating to the research projects. The dialogue within projects occurred in face-to-face conversations between the members in a small group setting and placed the users' intentions at the forefront of development. The empirical approach provides a co-created user-centered view of the insights and utilization of the digital transformation.

The two research settings, despite their slight differences in the execution methods, shared the same principles for innovating and evaluating digital solution and service opportunities when considering the user perspective. The developmental aim revealed people's opinions, attitudes and insights toward digitalization and enabled the discovery of the user's perception of the topic. The collaborative co-creation, further defined as a participatory-deliberative design process, was executed within the years 2016 and 2017. The researcher worked in both projects for organizing the events, facilitating the conversations and transcribing the conversation data into a text form.

Digital Café events were organized as a part of the larger Smart Countryside project, SMACK. The arrangement of the Digital Café events followed the World Café method with the principles of participatory design and deliberative democracy as the guiding framework for execution. The name Digital Café reflects well the aim and atmosphere of these events, since their purpose was to discuss broadly and in relaxed fashion the different features of the phenomenon of digitalization. The events were held in three Finnish locations: Kauhajoki, Rääkkylä and Kuhmo.

The Organizational Jury project concentrated on the development of the Tampere University Hospital child psychiatric clinic's services and operations from the user perspective. The participating members represented the clinic's personnel and the user base in condensed form as personnel representatives and children's guardians. The arrangement brought together all the vital stakeholders and allowed the necessary voices to be heard in the discussions. The project discussions happened in changing configurations of small groups within the project meetings. A total of four separate meetings were held within a month and the process followed the Organizational Jury method. An online discussion opportunity was also provided for the members, as an arena for discussion between meetings.

1.3   From the intention to the philosophical approach

The present study deals with the concept of digitalization, addressing the issues that the widespread digital transformation phenomenon affects. It is clear that the invasion of digital artifacts does not touch any specific field or discipline alone but goes in multiple directions, making it an interdisciplinary topic for research (see Palomäki 2020; Gil-Garcia, Dawes & Pardo 2018; Anttiroiko 2003). In this study, digitalization is researched in the context of the digitally enabled offerings of artifacts, services, and solutions. The underlying approach leans mostly towards public services, but since no idea for development should be restricted, the observed development of innovations is not limited to any specific area or supplier. Due to the obvious confusion and complexity surrounding digital technology (see Norman 2011), the usability and functionality aspects are selected as the main concern for the future of digital service developments. To find clarity, the study focuses on researching people's interpretations of their perceptions of their surroundings; the characteristics, form and texture of the environment; and the opportunities it affords digital development. The gathered empirical data reflect those opinions, needs, desires, and values that the user, whether an ordinary citizen or an organizational level actor, has regarding the ongoing transformation.

As this research is interested in the perception of people relating their surrounding environment and the placement of digital artifacts with it, it aims to understand people and the formation of their knowledge. The study's affordance approach considers the readiness and availability of the surrounding environment for the digital technology artifacts (whether hardware, software and network solutions) from the user's perception. The term 'artifacts' is itself interesting. An artifact represents a made object, which usually serves an intentionally crafted purpose, as Baker (2004: 99) states. Its meaning can appeal to function, senses, emotions or ideologies, and they appear contrasted with or parallel to natural objects. Baker

(2004: 101–104) goes on to explain how the artifacts are ultimately an aggregation of other smaller things, artificial or natural, that come to create the form and function of the artifact's appearance and operation. The digital artifacts thus take the appearance demanded of them, to appeal to the user, to illustrate its operational logic, to provide an aesthetic that attracts, or to serve any other function that the artificial artifact is intended to perform. These functional and aesthetic design choices, among other things, are features that for example Norman (2013) introduces as guiding cues for making the available affordances visible to people.

Based on this definition of the term artifact, the existence of the digital medium consists of a variety of digital artifacts, which are in turn formed from a smaller aggregation of digital entities. Regarding the use of a digital medium, Gibson (2015: 180–183) presents the theory of affordances as a way to see beyond the obvious, as it illustrates the functionalities of an object from the perspective of the relationship between an object and an observer. An object's affordances manifest based on the perception of the observer (i.e., how the qualities of the object appear to the one observing them). The affordance perspective is thus about the relationship between an object and an observer.

As Kautonen and Nieminen (2019) point out, 'digital medium' has different meanings for different people, so the affordances that can be detected from the medium also vary. Because each user perceives the digital artifacts from their subjective point of interest, the artifacts come to provide different insights into each user. The referred user-centered perspective follows the idea of the affordance approach, indicating how the functionalities should be understood from the observer's point of view. Due to the subjective nature of perception, it is meaningful to form an understanding of the user's interests, desires, and irritations for the creation of well-functioning and -appearing digital solutions. The elements of affordance theory guide toward this holistic understanding of the user's perception of their surroundings and the features of the digital medium within it. As the reality of digital affordances is formed through the user's subjective perception, this approach follows the phenomenological approach to knowledge formation.

Due to the presence of the human social and cognitive dimensions, the study requires an understanding of awareness that a hermeneutic phenomenological philosophy reflects. The hermeneutic phenomenological research approach attempts to raise understanding and awareness about the nature of things through human interpretation (Fuster 2019: 219-220). Miles, Francis, Chapman, and Taylor (2003: 409-410) explain that hermeneutic phenomenology builds on the ontological tradition of research philosophy, which forms awareness through the subjective perception of reality. Thus, the hermeneutic phenomenological approach

provides a perspective from which to understand people's perception as reality is formed in a dualistic manner between people and their environment. As with the case of affordances, the nature of knowledge as an acknowledged reality is formed in the relationship of the observer and the environment. This again suggests an epistemological nature of knowledge that ties subjective perception to knowledge formation, as Stoffregen (2003: 127) suggests.

Phenomenology

Puusa and Juuti (2020a: 23–24) describe research as a quest to solve a mystery. The research task contains an aim to find justified evidence to depict, explain and understand the underlying features of the researched event or phenomenon. The research ontology acknowledges a certain level of uncertainty and thus aims to produce justified findings that take into account multiple factors rather than stating a solid truth about a matter. The reliable and valid evidence is produced by utilizing methods and building on established research philosophy paradigms that are characterized by the features of objectivity, criticism, independence, and being systemic and unbiased. The research philosophy paradigms provide guidelines and assumptions that define the background awareness of the appearance of reality and the form of knowledge. Phenomenology appears as a research philosophy that elevates the human experience, people's perceptions, to be the target of research, as Huhtinen and Tuominen (2020: 286) state.

Relating to the ontological study of existence, the phenomenological approach represents study about the world as it is experienced: Laverty (2003:22) phrased it as being the study of the world as it is lived by a person. This view provides a way to reach genuine meaning by including the individual's subjective nature in the interpretation. Fuster (2019: 2017) encapsulates the meaning of phenomenology by explaining how it creates awareness of and provides meaning about the phenomenon being studied. Based on the described purposes, the paradigm functions to produce clarity within the complexities that lived experiences contain. The etymology of the term 'phenomenology', deriving from the Greek words *fainomenon* and *logos*, points toward the interpretation of existence, as Huhtinen and Tuominen (2020: 287) point out. *Fainomenon* refers to a thing that occurs, while *logos*, meaning something thought or spoken, insists on the consideration of reasoning and learning.

Huhtinen and Tuominen (2020: 287, 294–295) further explain how in phenomenological study the interpretation of subjective reality becomes apparent through the researcher's interpretation, the applied perspectives, the abilities of the researcher, and the ways in which the interaction influences the results more generally. The interaction of the researcher distinguishes the phenomenological study

from those more normally used in the natural sciences. Whereas in the natural sciences the researcher's influence is to be isolated from the research outcomes (the desire for so-called "research objectivity"), in phenomenological studies the researcher *should* identify or co-locate him- or herself with the experiences and perceptions of the subject. As the phenomenological aim is to describe people's perception as they experience it, the philosophy directs the study to a qualitative research approach that allows the subjective depicting of reality and provides space for interpretations.

Hermeneutic phenomenology

As the research aim states, the goal is to form an understanding of how people perceive the continuing digital transformation, its nature and its meaning, as well as its potential advantages and the subjective threats and fears it presents. The task requires not only an approach that records the subjective view but that also generates a holistic understanding of the subject. In the area of phenomenological studies, the hermeneutic approach ensures the correct interpretation and understanding of the research subject, according to Laine (2018: 27–29). Hermeneutic phenomenology focuses on the ideology of 'being in the world', which refers to existing in the world and experiencing things in relation to other entities, things, and the surrounding environment (Miles et al. 2003: 410). Our interactions with the elements and entities in our surroundings often produce constant interpretations based on our intuitive pre-understandings, as Laine (2020: 28) describes. The hermeneutic dimension detects the reactions and the behavioral signals that we express during our interaction with our surroundings. Meanwhile, the interpretation aims to capture experiences and expressions in order to form a comprehensive understanding.

Researchers Laine (2020: 32–33) and Miles et al (2003: 412–413) introduce the hermeneutic circle as a method of creating interpretations and clarifying perceived experiences. Miles et al (2003: 412) and Fuster (2019: 2020) likewise remind us that 'hermeneutics' originates from the Greek verb *hermeneuein*, which means the act of interpreting. This sets us on the quest of understanding 'the other,' not only through the obvious but also by detecting hidden meanings and subtle expressions. The hermeneutic approach can be illustrated with the circle that builds holistic understanding and progresses from pre-understanding to understanding. The hermeneutic circle operates as a methodological support to generate understanding of the research content. Laine (2020: 32–33) goes on to explain that by progressing along the circle the interpretation deepens from pre-understanding to a holistic understanding, as different aspects of the information help to form the pattern of interpretation (see Figure 3).
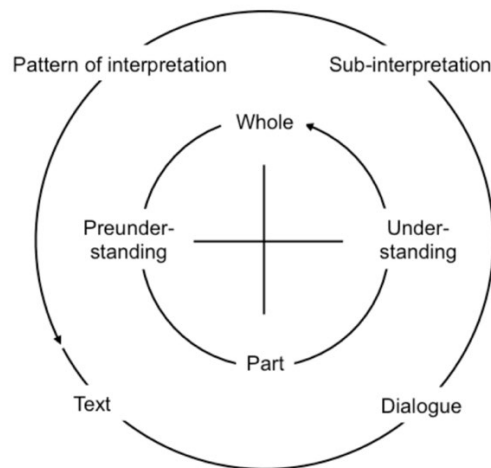
Figure 3.   Hermeneutic circle: basic version (Alvesson & Sköldberg 2018: 131)

The figure of hermeneutic circle, taken from Alvesson and Sköldberg (2018: 131), successfully illustrates how the knowledge and understanding is formed in a reciprocal loop, where the previous understanding is meant to be strengthened or supplanted with new knowledge aspects. As Alvesson and Sköldberg (2018: 123–131) indicate, the knowledge is acquired by interpreting not only the data (i.e., written or spoken text) but also the forms of expression and the hidden signals within the interaction. The dialogue brings a reciprocal nature to the knowledge acquisition process, as understanding is gained by the iteration of knowledge. The hermeneutic circle can be seen as a method of approaching hermeneutic phenomenological understanding (Laine 2020:25; Alvesson & Sköldberg 2018: 115–116; Crowther, Ironside, Spence & Smythe 2017: 826–827). The approach takes data-gathering to the qualitative research area, where the research data can be used to interpret and form a deep understanding of people's insights and experiences (Crowther et al. 2017: 828–832; Virtanen 2006: 170).

As the research philosophy steered the methodological approach toward qualitative research, the chosen methods provided arenas in which the research participants were provided with the freedom to express their insights, beliefs, and knowledge concerning digitalization (see Puusa & Juuti 2020b: 73–75). The participative events of the Digital Café and the Organizational Jury were also organized with a stress free and relaxing atmosphere in mind and the group discussions were hosted by objective facilitators to ensure the quality of the dialogue. The method of participative-deliberative design was adopted with the intention of ensuring multidimensional and quality discussion about user perceptions of digitalization (see Chapter 4.1). Before further explaining the research setting in the

research methodology, the study elaborates the meaning and formation of the factors shaping the theoretical framework of the study (see Figure 2).

1.4   The structure of this research

This thesis explores the opportunities and challenges of the digital development by using the structure of the research framework triangle presented in Figure 2. The elements of the research framework introduce the digital medium as the context of development; affordance theory provides the theoretical approach to digitalization's qualities; and co-creation activities within digitalization are presented as the instruments for development.

The digital medium is presented first in Chapter 2, as it provides the context of development. Digitalization is simultaneously a platform and a resource for the developmental aims. The chapter describes the nature of digitalization and its effects by considering the digital product and service-related issues, as well as the user perspective arising from the user's insights, needs and desires for future digital developments.

The affordance theory approach elucidated in Chapter 3 introduces a user-related perspective for understanding possible functionalities and inhibiting factors within the digital realm. The theory of affordances presents the theoretical framework of the study, which describes the nature of perceiving objects and features within our vision. The affordance theory perspective is applied from the discipline of ecological psychology to study the digitalization opportunities for product and service design. in this way the theory introduces a novel approach to the administrative sciences, as described at the beginning of this chapter.

The co-creation of digitalization is examined in Chapter 4, wherein the methodological approach of the study, which reveals user-related information and insights about the topic, is provided. The co-creation of digitalization is engendered by combining the methodological principles of participatory design with the theory of deliberative democracy. This novel methodological approach is introduced as the participatory-deliberative design. The introduced research method is used to discover user-related perspectives in mutually respectful collaboration, where the individual insights are honored and applied to the final results in a user-centered design manner.

The methodological approach continues to the description of the research setting, Chapter 4.2, which presents the aim and execution of the empirical research projects. The research projects of the Digital Café and the Organizational Jury were

conducted according to the principles of the participatory-deliberative design to assign user-related input about the opportunities and challenges of utilizing the digital medium to the design of artifacts, services, and products.

Chapter 5 reveals the user-related insights in an abductive content analysis (see Graneheim, Lindgren & Lundman 2017). The research findings reveal user perceptions of the digital medium by considering the observer's perspective, the environmental offerings, and the qualities of the digital medium for addressing developmental needs and desires.

The research concludes in Chapter 6, the conclusions and discussion, that approaches the research aim (Chapter 1.2) having gained the necessary results and with a considered appreciation of the theoretical framework. The conclusions define users' perceptions as interest, motivation, aims, and desires toward the utilization of the digital medium. The chapter ties the elements of the research framework triangle together and explains the user perception of the digitalization phenomenon.

2   THE DIGITAL MEDIUM

"Medium: A means of effecting or conveying something: such as a sub-stance regarded as the means of transmission of a force or effect" (Mer-riam-Webster Inc).

The noun 'medium' can be defined as above by referring to its inherent quality of transmitting an effect and thus providing a way of expressing or creating some-thing (a definition reiterated in the Cambridge Dictionary [Cambridge University Press 2021]). The use of 'digital medium' thus requires an understanding of the characteristics of the medium. The ability to create and innovate for future needs lies not only in the creative imagination but also in underlying knowledge about the prevailing conditions (Black, Freeman & Stumpo 2015: 131–135; Runco & Acar 2012; Tanner 1992). To design and create digital solutions and artifacts success-fully, it is crucially important to understand the characteristics of the surrounding space. This chapter on the digital medium provides knowledge on the elements included in the technological surrounding. The environment, as in medium, de-fines our perception and behavior, determining in turn the conditions for action by the observed characteristics. In the same way, Gibson (2015: 54–55) defines the terrestrial medium as consisting of earth, water, and air, simultaneously defining the conditions for existence and providing its qualities for creative utilization. See-ing things from different perspectives and occasionally 'bending the rules' in order to question existing ways has the potential to result in discovering something new and original (Torrance 1995)—or, as Runco and Acar (2012) put it, to bring out the features of divergent thinking and thus increase the potential for creative out-comes. In development work aiming to capture the opportunities of a prevailing phenomenon, it is worth considering the surrounding environment for all the po-tential that it holds.

Gibson's (2015: 41–94) considerations about the medium serve as a guide to the perceivable qualities of the environment and also people's abilities to perceive and sense the fine details and structural changes and transitions of that environment. The environment of living organisms that sense and interact with it on a cognitive level appears differently to each observer. Plants and other non-sentient species shall be treated as substances appearing in the observed environment. As observa-tions change between living and sensing organisms, the perception and the result-ant behavior depend on the ability of the observer to move. The environment can provide different reflections to two people observing what is ostensibly the same thing, as a result of their individual points of observation. While the view of the environment is uniquely based on the location from which it is observed, the level of insight is also defined by the capabilities of the observer. Since the sensing

capabilities of a human are physiologically limited, our view of the world can only be as complete as our perception allows it to be. The constraints of perception can thus limit our view, leaving missed opportunities beyond our apprehension.

The sensitivity and accuracy of human perception extend to being able to detect the details in the environment as the qualities of the medium, the features of the substances or the transitions of its surfaces. Following Gibson's (2015: 54–63) considerations of the environment, three characteristics predominate: the medium itself, the substances it consists of and the surfaces that separate them. To demonstrate the qualities of the environment, we can look at examples from the terrestrial elements mentioned above. The elements intersect with each other, so, as the medium contains substances and as they transition from one element to another, each of the elements are affected by the qualities of the other. This makes sense and is crucial to the perception of the environment, as the time, location and deviation of observation matters and influences the perceived view.

When day changes into night, the amount of the light travelling in the medium of air decreases, resulting in a much-diminished ability to see. Related to temperature changes, the appearance of moisture influences the visual qualities of air as well as affecting the surface separating the air and water; the interface between elements embraces new qualities. Changes in temperature affect the appearances of substances such as air, water, and earth. The moisture in the air varies according to conditions: water becomes solid when it freezes, while the warmth of spring brings new life to the ground as the living conditions for plants and other greenery become favorable (Gibson 20015: 55–58). The earthly environment provides diverse elements to its habitants, as landscapes provide different surfaces of soil, water, rock, and other natural elements. The physical environment, an ecological ecosystem connected to its biological ecosystem, appears in constant evolution, changing the appearance of the substances and surfaces of the otherwise familiar environmental landscapes (Vartanyan 2006: 10–11).

Air and water possess qualities of transparency and fluidity and support the successful delivery of oxygen vital for living organisms. These qualities create livable conditions as they support breathing, seeing, and moving. Light can pass through them, providing visibility and warmth; the lack of solid substances facilitates movement and locomotion; and the oxygen molecules contained in the environment can be used by living organisms. The laws of physics determine the possibilities of the environment and the light passing through the medium conveys to us information about its qualities (Gibson 2015: 55–58). Changing characteristics might inhibit or restrict life itself or interfere with certain aims and activities. Uzelac, Gligoric & Krco (2015: 427–429, 432) found that the surrounding

conditions affect people's behavior and capabilities. For example, learning abilities are affected by such conditions as temperature, humidity and surrounding noise level interfering with the ability to concentrate, resulting in a restricted learning ability and diminished expected learning outcomes. Through sensing, whether by vision, touch, taste, hearing or smell it is possible to form an understanding of the environment and the opportunities available in each time and location of observation. The resulting understanding of the qualities of the environment creates the basis for action and the goal-oriented thinking that seeks to use the environment for one's own benefit. Thinking of the environment as medium, substances and surfaces introduces us to the affordances that the environment provides (Gibson 2015: 55–58, 211).

The terrestrial environment appears to us in multiple ways, with conditions that change between seasons, according to the time of the day and according to our location on the planet. When narrowing our focus to specific circumstances, the detection of observations provides different results, but effects on the larger scale still remain. This emphasizes the holistic view of development, as each action has its cause and consequence, and every effect has its countereffect. Thus, the development of digital artifacts, services and solutions remind us of the considerations of the digital medium and how they intertwine and appear within our physical environment.

This introduction has so far highlighted the meaning of the medium and taken from the theory of affordances, which in a Gibsonian way reminds us to perceive the surrounding holistically both by detecting the different dimensions that exist therein and considering why they do. The following chapter offers an understanding of the digital medium and requests that we consider the apparent interrelation of related dimensions, like society, services, and people. As the research framework triangle (Figure 2) illustrates, interconnection exists between the concepts of the digital medium, the affordance perspective and the co-creation of digitalization. This chapter on the digital medium presents its characteristics and nature, and examines how its feature-rich qualities affects its surrounding and the view it presents to people.
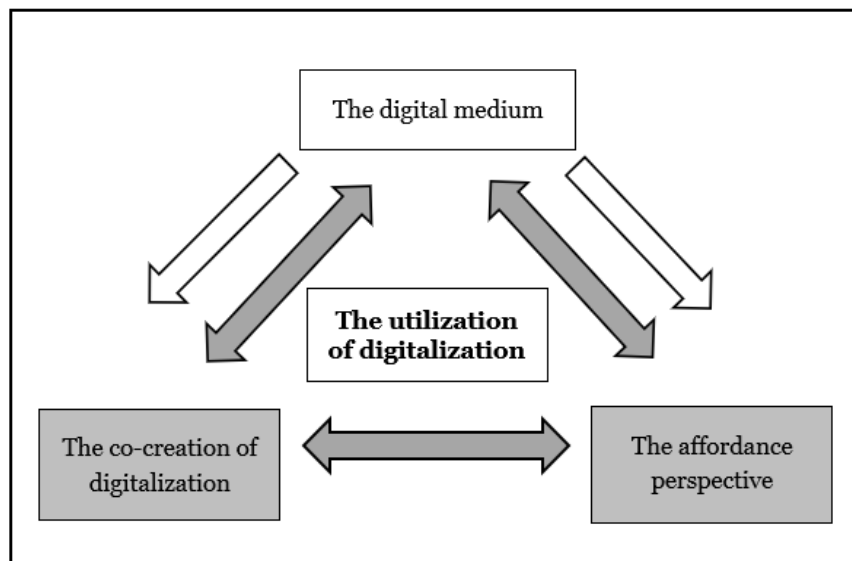
Figure 4.   The impact of the digital medium

The digital medium sets requirements for the user, doing so in different ways to different people. In addition, the medium offers different views of intentions and opportunities to the people perceiving digital artifacts and solutions, which emphasizes the importance of subjective as well as collective perception, as shown in figure 4.

2.1   The elements of the digital medium

When it comes to digitalization, the artificial environment provides opportunities through its electronic interfaces, providing alternatives and alterations to sensing, connecting, existing and being in an interplay with the environment and others in it. The digital medium provides an ever-developing ground, both in solid and immaterial form, that supports action by the devices and software throughout the whole operating ecosystem (Zimmermann, Jugel, Sandkuhl, Schmidt, Schweda & Möhring 2016: 31–33). Before investigating the affordances of digital technology it is worth looking at the digital environment, the digital medium. The ways in which digitalization envelops people in activities and interactions presents its diverse nature (Yoo & Euchner 2015: 13).

Digital technology permits actions by the use of its artifacts *within* the digital environment, *with* the digital environment and *through* the digital environment. The artificial environment of the digital medium allows actions through different interactions, of which some are in direct control of the user, some are gained through a computer-to-computer interaction, and for some the digital medium provides a

gateway for connecting with others. Due to the artificial, man-made nature of digital technology, each of the interactions can be altered for a desirable outcome and/or way of functioning, whereas the natural environment provides only a surrounding for adjustment (Immonen & Sintonen 2015: 589–590). Interfaces provide an insight to the digital medium, as the required interaction for an affordance to set place can happen in an interface between human and computer, computer and computer, or in a hybrid network of human and computer interactions (Shin 2014: 519–521).

Technology in its different forms promises to deliver various sort of advancement to its user. Millennia, centuries and even decades ago it was a matter of simple tools that supported activities in farming, hunting, building, etc. As time has passed digital technology has become preeminent in delivering required goods to people. With the complexities of digital technology, more characteristics need to be considered when making digital artifacts that will function as desired (Maceli & Atwood: 2011: 98–101). Researchers have already pointed out how digitalization changes services and the way public services are organized and delivered to citizens or customers (Dunleavy, Margetts, Bastow & Tinker 2005; Greve 2015; Margetts & Dunleavy 2013).

As technological devices in societies become more widespread for work purposes and leisure activities, the interaction between humans and computers has become an everyday activity, as the devices have taken their place in our everyday lives. The human approach for the use of technological systems functions to ensure the fitting of human factors together with the artificial ergonomics. The designs in this field aim to provide safe and healthy work environments and work practices along with the most usable technological artifacts to serve as our tools and devices. (Ritter, Baxter & Churchill 2014: 33–35) The interface between the machine and the human is the enabling factor influencing the success or failure of the interaction. Consequently, the expectation of interfaces also creates demands for fast learning and expectations of ease-of-use and effective ways to operate the artifacts. Together, these abilities promise cost-effective use of devices, which shows in decreased costs and increased profitability. The expected benefits offered by well-designed interfaces promoted the development of human-computer interaction, and the World Wide Web presents itself as a one example of a user-friendly software interface that triggered the success of the whole field of human-computer interaction research (Myers, Hollan, Cruz et al. 1996: 794–796). The research base for human-computer interaction comes from multiple fields, including computer sciences, psychology, and social sciences such as anthropology. The history of research on human-computer interaction dates back at least to the 1960s (Myers et

al. 1996: 798–799; Ritter et al. 2014: 33–34) and possibly further (Fong, Nour-bakhsh & Dautenhahn 2003: 143).

Humans possess social intelligence that affords them abilities that enable mastery of social interaction. The sophisticated gestures that people are able to perceive about each other when interacting socially creates fluent interactions and pushes them to favor human-human interaction. The design of human-computer interaction aims to mimic these qualities—a fact that becomes apparent for example in robots with human-like faces and social ways of responding to speech. The interaction with which humans are familiar promotes feelings of enjoyment and empowerment, and leads to the technologies becoming more accepted (Fong et al. 2003: 146–147). The consideration of human features and capabilities are of interest in many academic fields that concentrate on the development and design of effective technologies and systems for human use. The various research fields interested in human interaction with computers study User-Centered System Design (UCSD), User Experience (UX), User-Centered Design (UCD), Interaction Design and Human-Computer Interaction (HCI), among others. Even though these differ slightly in their approaches, they all have as a common factor an interest in the changing landscape of technology and its effects on people (Ritter et al. 2014: 33–34). Human-computer interaction already appears to be maturing, with a long examination of computer interaction resulting in the graphical user interface (GUI), that showed its intuitiveness with a graphic interaction that simplified the approach to computer use. The desktop paradigm, also known as WIMP (Windows, Icons, Menus, Pointing devices), provided a common appearance for personal computing (Porta 2002: 28).

An interface functions as the medium between a user and the executing operation, so the WIMP paradigm defined an easier way to operate technological devices. As technology progresses it becomes possible to make the interface controlling options more naturally fit the user's perceptions, expectations and gestures. The perceptive interface is a step away from traditional mouse and keyboard input modes and exploits information acquired from speech and vision-based inputs, such as head, face, and eye tracking, as well as recognition of human gestures. This technological development is an example of the multimodal interfaces that aim to promote effective and natural ways of interaction (Porta 2002: 28–30). Digital platforms are also taking interaction into a totally new medium, into the technologically provided virtual worlds. The presentation of a world in technological surroundings opens new methods of communication and create possibilities for training, education, experiencing and testing in safe surroundings. Virtual reality (VR), augmented reality (AR) and diminished reality (DR) appear as interfaces for the

changed interaction happening both between people and between people and computers (Cacho-Elizondo, Lázaro Álvarez & Garcia 2017: 323–326).

The concept of virtual reality first appeared in the 1960s with computer platforms that allowed the user to experience a physical perception of being immersed into a digitally created virtual world. After technological development that enabled more advanced digital imagining, the concepts of augmented reality and diminished reality started to appear. One well-known AR application is the 2016 PokemonGo videogame from Nintendo, which became a global sensation and combined a view of reality with added digital artifacts. Diminished reality allows users to experience the world by manipulating the perceived information, digitally removing distractions or other interfering elements (Cacho-Elizondo, Lázaro Álvarez & Garcia 2017: 325–330). Multimodality in computer interface interaction brings multiple channels for communication, as by detecting a variety of human senses the technology transmits the communication input for the computer system to interpret. The human input is detected by sensory technology that can differentiate the senses of sight, touch, hearing, smell and taste. Within the system of multimodal human-computer interaction, the user, the computer system and the meaning of interaction all combine to create or enhance usability. Modality enables suitable interactions, related to the information input situation as well as to the user's physical abilities; the detection of multimodal data allows a precise gathering of inputs and accurate interpretation of the data, as our communication occurs not just in speech but also in the expression of our emotions (Jaimes & Sebe 2007: 117–121).

Even though the design of human-computer interaction falls many times to the description of the technicalities describing how a certain communication can be arranged, like Jaimes and Sebe (2007: 116–117) bring out in their comprehensive survey about the multimodal channels for interaction. The key for functional communication lies in understanding the user who interacts with the system. What are their motives? What is the meaning, purpose and aim of the interaction? The computer system's qualities can be developed to serve these purposes, as technological progress already shows.

2.2 The introduction of digitalization

The change to our physical surroundings arising from digital effects has become overwhelming. The emergence of previously unimaginable technologies has narrowed the physical spaces between people, services, and societies. The digital transformation has sped up the flow of information and communication, generating both novel and known functionalities in a new digital form that promotes a

different, more mobile, more accessible lifestyle (Croon Fors 2010: 27). The invasive integration of information technology changes the existing dynamics wherever it occurs. The pervasive infiltration of digital technologies affects organizational processes and procedures as well as people's social capabilities. The information content as well as the way it is handled has led to a new era of digital transformation that strongly affects the social relations between people within the technological ecosystem (Zammuto, Griffith, Majchrzak, Dougherty & Faraj 2007: 751–752).

This technological ecosystem of digital artifacts is formed by the interconnected devices that comprise a constantly connected network that is building an all-digital society. The digital evolution of ICT alters society and people by profoundly modifiying the ways of interaction. The digital turn influences information and thereby knowledge from all angles, from information production and storing to the processing and transmitting of data at incredible speed (Castells 2010: xxiv, 29). The strong and ongoing evolution of digital technology is building a world of so-called ubiquitous connectivity, where interconnected digital devices are in constant interaction with each other and with their environment (Rodden 2008: 3837). These digital information and communication technologies are in interplay with multiple levels of society, affecting people in all of their environments. Work culture, for instance, faces the emergence of a truly mobile workforce, which is brought about by the rise of mobile technologies that enable free movement and mobility across space, time, and organizations (Nelson, Jarrahi & Thomson 2017: 54–55).

The above-mentioned development of ubiquitous computing changes people's roles within the digital ecosystem, which brings out the requirement for constant learning and updating of personal skillsets. The refreshment of knowledge and information for the individual becomes a demand in order to maintain a sufficient digital skillset to be able to utilize the prevailing digital developments. Despite all of its complexities and peculiarities, understanding the digital environment has become a requirement for interacting with it (Rodden 2008: 3837). The pace of the change's challenges people's technical competence as the development and integration of the ubiquitous connectivity continues to progress, narrowing the learning space for the required technical skills (Maceli & Atwood 2011: 103). The progress can be seen in the evolving technological development that constantly produces an increasing number of digital artifacts; these artifacts appear in multiple different variations, each with their own specific characteristics. The spread of digitalization becomes apparent with the variety of technological infrastructures and digital platforms and interfaces that are creating holistic changes to organizations and also influencing their external operating environments. The outcomes are seen as a variety of socio-technical effects influencing the production and

consumption of digital products and services. It is these socio-technical elements, along with the systemic structural changes, that define this concept of digitalization and determines it as a megatrend of our time (Hurtta & Elie-Dit-Cosaque 2017: 2744–2745).

The impact of the digital transformation, also called digitalization, is felt all around digital technology as it influences all the applications, methods and processes that have been digitized. The effects are promoted with reference to positive outcomes such as performance gains, and as it demonstrates the adaptability and resilience necessary to withstand changing demands, it has come to affect every aspect of organizations as well as comprehensively changing the way people work (Henriette, Feki & Boughzala 2015: 2). The data and information processing capabilities of digitalization are enabling productivity gains through increases in computing power, speed of communication and integration capabilities between systems, so that the increased information content is changing the nature of work and the social relations among the people doing the work. Clearly the increased complexity and uncertainty associated with these changing ways presents doubts and threats, but by correctly utilizing the information and communication technology (ICT) the applications can form a symbiotic relationship between each actor and the existing digital ecosystem (Zammuto, Griffith, Majchrzak, Dougherty, Faraj 2007: 751–752).

The construction of the digital world becomes apparent through people's cognition, which requires listening, feeling, and sensing the expressions being used, the tones in which things are expressed, and the body language relating to the impressions. Only by holistic observation it is possible to form an understanding of others' perspectives. In order to understand people's individual insights about the technological possibilities, restrictions and threats of digital transformation, the observations need to interpret individual perceptions as truthfully as possible (Saukko 2018: 265–2268). Even if the whole concept of digitalization leads ultimately to the technological developments of current digital technology, its effects may touch people in a variety of ways. The effects of this digital transformation alter human behavior by changing communication, by changing data management and by accelerating communication and information processing. Through similar means the effects influence the organizational environment and business field as well as societal and global issues (see Ashwell 2017; Yoo, Boland, Lyytinen & Majchrzak 2012). The appearance of the digitalization concept makes obvious how its effects spread widely among people and how it becomes a phenomenon easily understood differently between individuals (Bødker & Kokmose 2012: 448–450).

2.3   The nature of the digital

Digital artifacts and solutions are in a constant race to push either totally new devices or old ones with refreshed functionalities to the market. Development increases the complexity of the technology ecosystem and challenges the user's understanding with changing controls and usability of actions. This is a feature that can easily be seen as negative by users just looking for features such as reliability and functionality. Users' desires come in many shapes and forms: some users might be looking for attractiveness, some for affordability, some for quality—but all of these require the developers to focus and pay attention to the users' perspectives (Norman 2013: 32–36). As the popularity of the personal computer, PC, rose, it soon became clear that the user experience needed to be redesigned for the average person. Understanding human-computer interaction began to attract more attention among developers as the computers' popularity grew and the devices became more complicated (Maceli & Atwood 2011: 98–100).

Understanding digital opportunities and limitations offers an advantage for organizations and businesses to utilize existing strengths and balance their operations as well as prevent possible crises (Rochet, Keramidis & Bout 2008: 65–67). The liberation of work practices to facilitate more mobile and remote work, for example, presents itself as an outcome of successfully utilizing existing digital achievements. The successful exploitation of digital possibilities reflects a functional balance between the user and the developer in the holistic understanding of the underlying possibilities of digital artifacts and the usability of their functions (Nelson, Jarrahi & Thomson 2017: 54–55). While the development of mobile technology and the Internet created the ongoing digital transformation (Reddy & Reinartz 2017: 14–15), people at the core of this technological infiltration use anticipation, coping and adaptation to conquer upcoming challenges, in ways similar to Duchek's (2020) conceptualization of the definition of resilience. Digital reach challenges the internal locus of control as it comprehensively influences people's ways of living, working and even relating to each other (Bajer 2017: 91). This symbiotic relationship between each actor and the existing digital ecosystem (Zammuto et al. 2007: 752), as well the interconnectedness of digital technology, stresses the importance of the user-focused approach in the development of digital artifacts and solutions (Ritter et al. 2014: 43).

As digitalization becomes more and more essential to everything connecting people and affecting multiple actions in an interconnected manner (Parviainen, Tihinen, Kääriäinen & Teppola 2017: 64), it becomes clear that the concept and its usability need to be understood clearly (Lanzolla & Anderson 2008: 73). The user-centered approach addresses the usability issues by considering the user's

perspective within the creation of solutions, as it aims to provide a personalized and needs-based offering of goods and services that are created and modified according to the values, goals, beliefs, and behavior of the targeted user group (Kramer, Noronha & Vergo 2000: 46). It is ever more apparent that the user approach enables the formulation of a more comprehensive understanding of the managed issues, which, in the case of digitalization, turns into the better overall quality of the technological offering as the usability and functional execution of the solutions are increased thanks to a good understanding of the customer base (Volkoff & Strong 2013: 821–822).

As the phenomenon of digital transformation holds enormous potential in the use of data for discovering, capturing, storing, processing, monitoring, and securing information, it also includes the challenge of exploiting all the available data. The constructs of the Internet of Things and the concept of Big Data (mass resources of information) provide a competitive advantage when the available knowledge, insights and understanding are holistically exploited (Ashwell 2017: 393–394). Ashwell (2017: 394) defines three factors—data, digital technologies and people— as forming the elements of digital transformation, which highlights the importance of the interrelatedness between parties for achieving successful decision-making and innovative solutions. With its connectivity and interaction requirements, digital transformation aims to engage people from the whole organization environment to capture all the relevant data for goal-oriented development.

While technology provides access to innovations and to the building of organizational productivity, the challenge is not just to detect usable technology but, more importantly, apply it usefully to existing organizational processes and models (Earley 2014: 58). Bekkers (2012: 329–331) stresses how the of digital benefits lies in the redesigning of current work methods or in the creation of new solutions to supplant previous processes for the achievement of a better outcome. Digital technology and the digitalization of administrative actions promise effectiveness through different activities that ultimately depend on the redesigning of the interactions among services and processes, which should then appear as more open, user-friendly, participative, or more effective ways to organize functions. The suitability of technology can be expressed by how well the technology fits its intended use, as Muchenje and Seppänen (2023: 1–2) indicate. The benefits are best achieved by a functional interaction between the task requirements and technological offering, where the digital technology characteristics of being generative, embedded, editable, reprogrammable, and non-material support its suitability, as the task-technology fit (TTF) theory explains.

Within the organizational environment, the evolving digital transformation enables the promise of effectiveness both for people through a cross-border collaboration but also for the organizational processes, which can easily become a requirement after the feature becomes known. The target solutions need to be holistically integrated into organizational models and processes, with the ability to redesign the existing methods for the desired functionality (Earley 2014: 58–59). Bekkers (2012: 331) demonstrates this relationship between digital transformation and innovation with Joseph Schumpeter's definition of innovation, as creative destruction sees past methods surpassed and rendered obsolete by novel and better functioning solutions.

Earley (2014) points out the paradoxical nature of digital technology: the solutions often come with a promise of productivity, but once applied they present new complexities resulting from the new set of digital tools and infrastructure. The paradoxical nature can also defeat the desired results. The evolved interaction nowadays includes several different actors coming from different sectors of the organization, but for productivity gains digitalization must prioritize customer needs. The interrelated connectivity is a strength of the digital transformation but also its challenge (Earley 2014: 58–59). As the intention of an organization could be stated to be providing a benefit and value to the customer, the development of service delivery aims to understand and fulfill the customer-specific needs in a detailed manner to achieve customer satisfaction. Successful service delivery provides a match between the organization's intention and the customer's needs and wishes. The interaction can be divided into few key factors such as the service operation, experience, outcome, and the end value of the service. The service concept explores a detailed description of the expected customer, defines what needs to be provided for the customer and identifies how actions could be operationalized. The whole service system requires diverse considerations to be contemplated in the development and evaluation of the service delivery (Goldstein, Johnston, Dussy & Rao 2002: 123–124).

Digital means and goods afford multiple actions for their users, so as they provide different possibilities these digital artifacts act as the medium for purposeful actions (Godlkuhl & Perjons 2014: 29). The nature of technological solutions and artifacts is to act to support human activities and to enhance the capabilities that are otherwise limited by our physiology. Even the nature of technology can be a source of conflict, with some being in favor of the rise of technology and others more doubtful and against it. It is still clear that the nature of technology has become an integral part of human lives, earning a role in decision-making, problem-solving and justification of choices. While technology has evolved as ubiquitous, the offerings provide novel and alternative choices for consideration, making the

technological dimension present in most societal actions from politics to financial markets (Willoughby 2004: 12–14).

As the integration of digital transformation keeps evolving, services often now contain a digital interface at some point on the delivery chain, whether in a direct customer contact, among the delivery processes or somewhere in the service process. Following this development, the sociotechnical understanding about the responsibilities of who, how and why become key for successful service interactions (Alter 2010: 17–19). The existence of an IT artifact adds a dimension between the service provider or organization and the customer, thereby increasing the scope of examination for service development. The addition of an IT artifact increases the required focus on service production and delivery, including the service provider and user perspectives as well as the temporal dimensions of before, during and after the interaction, as the digital content requires its own attention for achieving a functional service delivery (Goldkuhl & Perjons 2014: 29–30). The diminishing of time and place are not the only benefits digitalization can produce. In digitized form, content can be compressed as well as differentiated for precise correction and adjusting. All of which needs be taken into consideration in the aim of successful service interaction. As digital content allows the adjustment of data, it liberates the information flow in ways both good and bad. Easy access and modification provide possibilities but also enable information misuse (Negroponte 1995: 16–20). Through the holistic use of technological advantages, digital transformation promises value for society. With greater participation, information sharing, experimenting and effective re-arranging of work methods, digitalization offers possibilities to address current and future administration challenges (Redddy & Reinartz 2017: 14–15).

With its qualities and networking capabilities, digitalization is showing such promise that operators have seen the need to jump into the hope, hype, and opportunities that it promises to deliver. The market hype has brought an added "e" concept to many organizations' products and service delivery. The "e" (from "electricity") is seen in e-business, e-commerce, e-economy, e-service and just about anything else related to business and organizational operations. Over time the scope of "e" has also evolved from the role of mediator between supply and demand to the more holistic integration of digital technology into organization operations. The e-activities range from users' acknowledged actions with technology all the way to the invisible computerized activities within the IT infrastructures (Alter 2010: 15–16). While the added digital dimension resembles the increase in value the actors expect from ongoing digital development, it is beneficial to contemplate the meaning of the pursued values as goals vary according to the actors (Alter 2010: 17). For the end-user, the desired service value is shaped by personal goals, beliefs, and

behavior (Kramer, Noronha & Vergo 2000: 46), whereas the organizational value can be found in achieving a competitive edge in the market or the capability to withstand abrupt changes and crises (Rochet, Keramidas & Bout 2008: 66).

In the inspection of services, value to the customer forms the primary goal and the means to deliver that value is the secondary. In this light, digitalization resembles the means by which a service, whether it is a customer interaction or a product offering, is served. The differentiation between a service and an e-service consists of the presence of digital interference at some point in the service interaction (Alter 2010: 18). Digital change has affected the customer in such a way that their needs and desires need to be considered with more care and according to an individual approach. For successful services or products, the supply needs to be carefully crafted to provide a user-friendly and functional customer experience, which therefore places the user at the core of the development line (Earley 2014: 59).

Without full understanding, the perception of the promises and hazards can be deceiving: this is how developmental execution or product planning can turn against itself and create a misconception about the phenomenon (Alter 2010: 15–16). McNutt (2014: 63) reminds us that despite the enormous possibilities that the digital transformation is expected to deliver, it doesn't come without challenges. The three critical challenges that she identifies are related to information management, privacy, and security issues. But even though these challenges are valid, they are still simply a new manifestation of known problems that now reveal themselves in a digital form. As demonstrated, the nature of the digital medium presents a vast number of perspectives, all of which play a role in utilizing digital advances to their maximum potential. As digital artifacts are made by people, their meaning is crafted to serve people—in one way or another. The utilization of the digital medium requires knowledge about the environment it will be used in; understanding about the user group's abilities, skills, motivation and interest in the digital solutions and artifacts; and the perception of the advantages the digital medium could provide. In this way it becomes clear that exploitation points in many directions: to the environment, to the people and to digitalization itself.

2.4   Understanding digitalization: the evolution of digital progress

Even if digitalization appears everywhere, the concept often remains abstract for the average user. The shift in technology has embedded digitalization into everything possible: physical objects are becoming digital and artifacts are given digital dimensions for connecting to virtual environments. While digital artifacts connect

to our surroundings in various ways they also transform our actions and the human conception of existing possibilities (Croon Fors 2010: 27). The possibilities of technological development and digitalization in particular have been noticed, and with its productivity gains technology in its current digital form offers people many benefits. But digital transformation has its downsides, as progress is built on destruction, novelty overruns existing habits and the human mind is easily distracted by unnecessary trinkets (Mehmedi 2013: 83–86).

At root, digital transformation depends on digitizing existing content. The binary code that appears as string of 1's and 0's forms the language of digital technology, which produces the meaning and content of digitized objects and actions. Digital representations can be coded to illuminate their purpose in any way their creator desires. Beginning from something as simple as presenting numbers in a digital form, the development of digital technology has enabled the successful digitizing of far more complicated content such as audio and video. Physical content such as newspapers, books and pictures have been translated into electronic form, but the evolving digitalization also reforms social situations like customer service. In their digitized form, products and services can be transported at high speed to diverse destinations through information networks (Negroponte 1995: 11–15).

In the early 90s the World Wide Web was introduced as a way to gather existing information from different sources to create a pool of collaborative human knowledge (Berners-Lee, Cailliau, Luotonen, Frystyk Nielsen & Secret 1994: 76). Since then, the concept has then turned into ubiquitous computing power enabling the formation of information management as it is seen today (Funabashi, Homma, Sasaki, Sato, Kido, Fukumoto & Yano 2008: 60).

> *"Twenty years from now, when you look out a window, what you see may be five thousand miles and six time zones away."* (Negroponte 1995: 7).

Negroponte (1995:7) demonstrates in a metaphorical way how predictions concerning digital development are currently coming true, no matter how wild they may have sounded previously. Negroponte illustrated the changing apprehension of temporal and spatial dimensions as well as the futility of denying anything that seems impossible. On every stage, technology has proven just how far its development has reached in very little time at all. The technological development of digitalization has become embedded in our everyday lives in ways unimaginable just two decades ago, providing digital connectivity to all things physical. The opportunities have since enabled virtual connectivity for socializing, shopping, and experiencing the world (Croon Fors 2010: 27–28).

By the mid-1990s, computers were becoming more and more generally popular. Computing started to blend into everyday life and could unabashedly be referred to as part of living. At that time the birth and spread of the Internet played a major role in opening multiple opportunities for computing. Along with the progress of digital technology and related software development, the use and popularity of IT was growing exponentially among the global population (Negroponte 1995: 4–6). Funabashi et al (2008) continue the digital development story by drawing from the information society roadmap introduced in 2001 by the Council of Science and Technology Policy. They refer to the societal progress toward the ubiquitous information society that was introduced as a goal for 2010. The progress was portrayed as proceeding from broadband Internet in 2001, to ubiquitous network society in 2005, to the interconnection of devices and the advent of wearable devices for everyday use by 2010. The innovative use of technological advances brings digital devices into people's presence so subtly and intuitively that people are hardly even aware of the devices' existence. This ubiquitous computing provides endless communication possibilities with mobile technologies as it also extends the human concept by integrating IT and the human body. As new devices are constantly emerging with simultaneously evolving possibilities, the digital future is becoming more difficult to understand and control. The effect requires the consideration of the socio-technical aspects resulting from the consideration of people's social needs and requirements (Funabashi et al. 2008: 60–64).

The defining features of digital transformation are the evolving communicative and interactive dimensions of the technology. The information and communication technologies can be described as developing from the one-way broadcasting paradigm to the more interactive communication paradigm, and all current progress is moving toward the ubiquitous engagement of digital technologies (McNutt 2014: 50). The direct access to information technology enables a stronger engagement between people, which strengthens true participation and the sharing of ideas, doubts, and feedback for shared awareness (Oldham & Da Silva 2015: 7–8). The intrusive nature of digital transformation offers benefits to a wide cross-section of users, from organizations to customers, and from individuals to societies. With its cross-border integration, digitalization is shaping organizations' operating cultures and moving organizational boundaries between sectors (Reddy & Reinartz 2017: 14).

According to Parviainen, Tihinen, Kääriäinen and Teppola (2017: 64), digital transformation can be described as the use of digital tools and applications, but also as the transformation of products and services into their digital equivalents. Digitalization appears as a widespread use of digital artifacts and solutions in organizations, countries, and societies. The multidimensional nature of digital

transformation presents itself as a vaguely expressed concept that expands its methods and effects in many directions in a complex manner. Digitalization contains all the aspects of integrated technologies, from the need to utilize the technologies all the way to the effects of the digital means. The interconnectedness of everything through digital artifacts is the prevailing characteristic resulting from this highly complex reality, and shows how our ubiquitously our present society is connected. In order to understand holistically all the dimensions of the concept, digitalization needs to be viewed thoroughly from multiple perspectives (Lanzolla & Anderson 2008: 73).

2.4.1 Technological development

As mass production created the industrial age, so computer development brought the age of information. Along with digital development the ongoing societal progress of the information age has almost unnoticeably arrived at a post-information stage. The advanced computing capabilities have modified the meaning and value of time and space, making these features distinguishable for the current era (Negroponte 1995: 163–165). The trend of the information society emerged in the early 1970s alongside the concept of post-industrial society, when service economy was become more meaningful as industrial labor retreated. In the post-industrial era the importance of knowledge and human capital gained more attention as businesses showed increasing interest in the creation of more effective infrastructures and means of production (Ampuja & Koivisto 2014: 448, 453-456). The nature of work started to move away from manual labor into knowledge-work, where the productivity of labor is achieved by designing the operations effectively to meet task goals. Within a knowledge society, the productivity that used to be defined by the physical effort and time put into the task started to fade away; work became developing new tools, new methods, and new technologies to engender greater efficiency. This movement toward knowledge work remains one of the features characterizing developed economies, making the knowledge-workers and their productivity the most valuable asset of most current organizations (Drucker 1999: 79–80, 81–85).

In the post-industrial era, theoretical knowledge gained a more prominent role binding science and technology closer together as it promised the rise of fresh innovations (Ampuja & Koivisto 2014: 450). An analogue to the current transformative development of information and communication technology can be seen in the 15th century invention of the printing press. The printing technology revolutionized the meaning of information and communication and changed the whole concept of media. Current technological developments in this time of social media

and mobile and even wearable digital devices continue to emphasize this powerful correlation between technology and information (Macnamara 2010: 1).

The current information era has been evolving since the mid-1970s, when the value of information gained increasing attention, as did the relationship between technological development and societal change. The concepts of knowledge society, learning society and new economy offered new ways to understand the then-current social condition. In changing times, concepts such as the creative economy and the dream economy also offered a continuum with previously mentioned trends, whose lifespans had proved variable. Technology has had a significant role in the development of the information society but now we have reached an era when digital content has overtaken it in importance (Mannermaa 2007: 109–110). The technological revolution of the past decades, featuring the digitalization of information processing and communication technologies, has had a major role in current societal change. Technology has become an integral part of our societies and a full understanding of societal interactions and factors can only be achieved by appreciating the involvement of technological elements, as Castells (2010: 5) states.

The technological revolution of information and communication technology has encompassed the entire world, as advanced technology has become more accessible and capable. Along with technological development, the process of globalization creates global reachability and influences societies and people in several ways, including in the areas of economies, media culture and politics (Castells 2002: 548). Information availability and media broadcasting shift the boundaries of work and leisure time, as the consumption of information content happens on demand and depends on individual needs. Technological development starts a loop of changes, where the availability of a technical feature creates a new need from the end-user perspective and brings about a set of requirements for the technology. Changes in information availability and media broadcasting affect users' consumption behavior and modifies users' requirements for the nature of information access and availability. Whether for people, a product or a service, the post-information age has created a demand for continuous access and availability (Negroponte 1995: 168–171). The current information society characterizes information and knowledge as the backbone of societal progress, and the use of technologies shape our actions and existence. Understanding information as an integral part of all human activity confers on information the status appropriate to it (Castells 2010: 70).

The conceptualization of each era illuminates the significant influences of its time, including the views and perspectives arising from different disciplines. During the

era of the information society, different approaches earned recognition as important. Information, knowledge and learning each represent the nature of the acknowledged societal changes. So too do the ends of society and economy present their developers with necessary focuses (Välimaa & Hoffman 2008: 265–270). In a time when interrelated interaction shapes the functioning of society, Castells (2002: 548) defined the social structure as a network society. The presence and interaction of three features (the revolution in information technology, the progress of globalization and the emergence of networking as new form of organization) defines the meaning of networking. In a knowledge society, knowledge is acknowledged as the foundation of the economy and social actions and as intangible capital powerful enough to displace manual labor. The concept of the knowledge society introduced globalization and led to the rise and influence of the developing digital technology affecting the societal order and creating worldwide interconnectedness between different actors. Each of these societal concepts demonstrate how different phenomenon move and develop simultaneously, without clear boundaries between them (Välimaa & Hoffman 2008: 266–268). Just as the information technology paradigm builds on information, with technology proving characteristically pervasive, the networking of information systems means that flexibility comes to dominate the paradigm. Flexibility allows the modification, alteration and rearrangement of processes and configurations. The ethos of flexibility also brings the opportunity of experimental networking and freedom to experience and modify (Castells 2010: 70–71).

Over the last two to three decades, the emergence of digital world has shown an incredible change in our ways of thinking; a result of ubiquitous connectivity and computer presence. Along with the Internet, digitalization has created a globalization paradigm that challenges us to think differently, where risk-taking is favored and counterintuitive approaches are embraced in the search for innovations. In the digital sphere all views are valid, as results do not originate in one discipline but in the blend of all disciplines (Negroponte 2000: 417–418). The development of computer and internet technology has effected a digital transformation affecting nearly everyone everywhere. Digitalization comprehensively intersects our ways of acting and interacting (Reddy & Reinartz 2017: 11).

Digital technology's ability to create connections between different actors through digital artifacts is building a digital society, in which information is generated, stored, retrieved, processed, and transmitted at ever-increasing speed (Castells 2010: xxiv, 29). Virtual spaces can co-locate people from all over the world and allow them to operate together regardless of their physical location. The 'post box' for an email is wherever you find yourself able to connect online. The response time of an inquiry has progressed into real time, bringing to previously

asynchronous communication the requirement for synchronous interaction (Negroponte 1995: 165–168). While ongoing digitalization influences people in a sociotechnical manner, the same effects also appear at the larger scales of the societal and organizational levels. Organizations, regardless of whether they are private or public, must take current technological advances into consideration when developing their mission, their objectives and their strategic models, in order to withstand sudden changes and possible crises during turbulent times in their operating environment (Rochet, Keramidis & Bout 2008: 65–66).

The pervasive integration of information technology is changing existing dynamics, wherever it is used. IT is set to infiltrate organizational culture and structures holistically, affecting processes and procedures as well as the social capabilities of the whole entity. Information content and the handling of it is changing alongside the social relations among people. Information and communication technology represents a set of tools that form a symbiotic relationship between each actor within the technology ecosystem (Zammuto, Griffith, Majchrzak, Dougherty & Faraj 2007: 751–752). The diffusion of digital technology and the internet has begun breaking boundaries in work and life where barriers use to exist. The interconnectedness of everything through digital technology is shaping a more complex reality, where everything affects everything else (Lanzolla & Anderson 2008: 73). The possibilities of communication, efficient information processing and data management have all leapt forward due to the development of digital information and communication technologies (Sunita & Narang 2014: 6). Characterizing our current time is the constant presence of digital technology. Novel digital technology is intruding into everyday products and services and influencing the very core of organizational operations (Yoo et al. 2012: 1398). The characterization of current technological transformation highlights the effects that the interconnectedness of information and communication technologies have on current societal progress. The infiltration and integration of technological functions builds ever-growing interdependence between operations and units. Along with integration and use, developmental goals for technology include its becoming an indistinguishable part of operational processes (Castells 2010: 70–72).

With computer, communication network and mobile digital technology developments, the progress of the information society has taken enormous leaps forward. Societal progress has happened with technological advances but also in the use of information. The consumption of information occurs in parallel with technological development and humankind has reached an era where people have access to more information than they are able to absorb (Kushlev & Proulx 2016: 1–2). Digital progress has profoundly changed the nature of interaction in services and between people. Moreover, information and communication technologies have developed

concepts referred to as Web 1.0, Web 2.0 and Web 3.0, which are changing the interaction between people and digital entities. Web 1.0 refers to non-interactive information broadcasting, whereas Webs 2.0 and 3.0 illuminate the social, co-operative and participative development of digital interaction, both for people-to-people and computer-to-computer interactions (Barassi & Treré 2012: 1270–1271). One characteristic of Web technologies is that each version's development occurs in parallel with current technologies, and the first appearance of each concept is markedly vague. Inherent to the nature of each development is every stage defining what the previous version was *not* (Allen 2012: 262–265).

Technological development towards the more participative, open, and collective solutions referred to as Web 2.0 has brought a shift in Internet-user culture towards greater involvement and willingness to be influential (McNutt 2014: 49–50). The development of information and communication technology has moved from one-to-one communication into many-to-many communication. The rise of Web 2.0, the so-called social web, emphasized the sharing of ideas, knowledge, experiences, contacts, views, interests and so on. By connecting and interacting, people promote relevant, user-generated content inside the Web 2.0 interfaces (Bekkers 2012: 337). With the ubiquitous engagement of digital interconnectivity, technology is reaching people and building networks based on people's interests. Through the digital connectivity, technology is enabling and facilitating new types of content creation. These Web 2.0 technologies offer new reachability and accessibility for people and services (Lanzolla & Anderson 2008: 76). In a society in which wirelessly connected digital technology is ubiquitous, the developmental aim has focused on content development featuring applications and people's needs. The advance in recent technological development even provokes the question of whether the present era should be described as "information society part two," as named by Mannermaa (2007: 110).

As mentioned in the introduction, Mark Weiser introduced the term "ubiquitous computing" in 1993, when it was still only a vision for the future. According to Weiser, ubiquitous computing refers to the aim of achieving so effective a computing environment that the use of it becomes almost invisible to the user. In ubiquitous computing, the whole technological ecosystem functions in a continually interacting relationship, where awareness of ongoing operations fades from the user's attention, allowing them to focus on other tasks in life and work. At the time of publication (1993), computer hardware and software was still insufficiently developed to enable ubiquitous computing. Yet despite Weiser's publication now showing its age, the same physical principles still apply in relation to the presence and usage of ubiquitous computing. Unnoticeable interaction inside the information and communication technology (IT) ecosystem creates a usability

requirement for the equipment. Its physical size and shape need to be convenient for the task, while the software to create a usable experience needs to be intuitive enough for the functions to become invisible to the user (Weiser 1993: 75–76).

As Mannermaa (2007: 108) states, the concept of ubiquitous society describes this current mobile and digital technology -filled era. Mannermaa (2007: 108) defines ubiquitous network society as "a society, where wireless data transfer and networking is possible for anyone, any place and whenever using different devices". This definition reflects the strong presence of technology and the content opportunities that become possible through it. In the creation of ubiquitous network connectivity, ubiquitous computing has created an era in which digital technology and the Internet has brought all human knowledge within our reach (Zittrain 2008: 3813). Ubiquitous computing has provided not only the means to answer how, but also what, when and where (Kushlev & Proulx 2016: 1–2). Alongside its other features, the reachability of the current digital transformation comprehensively influences our ways of living, working and even relating to others. This ongoing technological infiltration makes the qualities of adaptation and resilience necessary for people to conquer the upcoming challenges of change (Bajer 2017: 91). Rapid technological development pushes new concepts to the market as novel features are invented. Kaivo-oja, Roth and Westerlund (2017) gather these trends, which resemble digital change and have emerged along with technical developments, as they all exist in relation to the technological possibilities of each time. Web 4.0, ubiquitous society, internet of things, big data and cloud systems are technologies that all resemble examples once generated by concepts that describe different characteristics of current technological advances.

2.4.2   The ubiquitous digital future

The rise of technology has made its existence ubiquitous in societies. Over recent decades technological development has increasingly intruded into everyday activities and a variety of industry functions (Brunetti et al. 2020; Willoughby 2004). Currently, the emergence of artificial intelligence along with the development of machine learning have aroused great interest in all sectors of society. Among others, public organizations have detected an opportunity to increase or enhance their administrative processes and services to citizens by using up-to-date technologies, such as AI (van Noordt & Misuraca 2022: 426–247).

The existence and increased role of technological solutions is obvious across societal activities such as agriculture, transportation, manufacturing, communication, and health care. Food manufacturing and distribution, for example, contains multiple technologies vital to its functioning. Technology has been present for

millennia even in its most primitive functions, such as hunting and cooking. As different technological artifacts and solutions have become more capable of delivering desired outcomes, the role of technological artifacts has drifted from their supporting function to the point that technology is mediating operations that used to be carried out by people (Willoughby 2004: 12).

With its evolving capabilities, digital technology is reshaping previously known products, changing their appearance and functionalities as well as creating new ones. The emergence of mobile phones has already changed how we communicate and the evolution of so-called "smart phones" added an enormous number of functionalities to the device that use to be referred to only as a phone. The technology industry is known to push new innovations as development progresses and corporations such as Google, Nokia, Samsung, Apple, and Microsoft are in constant competition to lead the technology market (Yoo 2010b: 3–4). In 2007, Apple presented its first iPhone, introducing a new way of interacting with mobile devices (the touchscreen) and, more importantly, an application store that allowed users to expand the phone's capabilities in totally new directions. Since smart phones were first introduced, these mobile devices have become music players, books, media and entertainment centers, and many other things (Bødker & Klokmose 2012: 448–449; Yoo 2010b: 3–4). Mobile application stores, like the Apple App Store and Google Play, have revolutionized the industry and even led to the introduction of a term 'app economy' as a result of the success of the mobile ecosystem (Hyrynsalmi, Seppänen & Suominen 2014: 61–63).

In addition to phones, the "smart" appellation has reached television and other technological artifacts, such as tablet computers, watches, etc. Smart solutions represent software add-ons that have the ability to adjust the functioning of the artifact to address the user's preferences and therefore provide a more targeted and individual experience of the device (Foroudi, Gupta, Sivarajah & Broderick 2018: 271; Bødker & Klomose 2012: 449). While computer technology has become more invisible, interactive, and mobile thanks to capable sensor technologies, these smart technologies have started to interact with people by providing feedback and guidance on our activities and sometimes even overwriting human decision making. The sensor technology implanted by the automotive industry presents multiple examples of the presence of smart technology, with the car providing feedback to the driver based on their location and safety, and security instructions about the functioning of the car and about the alertness of the driver. Today's technology is even ready to take over the driving (Guthrie 2013: 324–325). Smart technology can generally be referred to as an intelligent system that can improve its performance by responding intelligently to stimuli in its operating environment or condition. The continuous interaction between each part of the system

(software, hardware and the environment), and the ability to adjust overall functioning according to the detected stimulus, differentiates a smart technology from a "dump" technology of predetermined functionality (Goddard, Kemp & Lane 1997: 130–131).

The interconnection between intelligently operating smart technologies reveals another concept known as the "Internet of Things" (IoT). The IoT connects multiple computing devices together through data networks, providing an endless amount of information for consumers and corporations to take advantage of. Increasing computer hardware and software capabilities provide unlimited possibilities for effective computer assistant operations (Guthrie 2013: 324–325). Weiser (1993: 75–76) referred to ubiquitous computing as the future world, where the most effective technology is within everyone's reach and benefits their everyday activities. In today's world, the Internet forms the backbone for most up-to-date digital communication and the birth of the World Wide Web remains comparatively recent. In the beginning of the 2000s, about ten years after the advent of the World Wide Web, the digital revolution was ready to change information and communication technology; the nature of broadcasting has experienced major changes ever since (Kovarik 2011: 315).

Allen (2012) reminded us how digital development builds on top of existing technologies; future visions are also worth building with past developments in mind. The development of the internet is of post-war (i.e., after the Second World War) origin, when the development of computer networks enjoyed an abundance of funding as the aim was to link computers efficiently in order to improve communication systems for the defense and research industry. The United States Department of Defense established the Advanced Research Project Agency (ARPA) in 1958, which later shared an idea of networked computing. In 1969, the digital network ARPANET as born as a system connecting existing computer networks together. The science community along with the defense industry were the first to take advantage of computer networks' ability to share information, collaborate, and connect in real time. After the advent of networked computers, the idea became global, commercialized, and different types of digital networks were developed as a precursor to the Internet (Kovarik 2011: 297–307).

In 1989, Tim Berners-Lee, an employee of CERN, the European Organization for Nuclear Research, came up with the idea of the World Wide Web, an information system that would open the door to the Internet (Savage 2017: 21). The World Wide Web, also referred to simply as the Web, facilitated Berners-Lee's idea to make all the information stored on computer available everywhere by displaying the network content through a single computer program. Thanks to Berners-Lee's

insight, the first website built was at the European Organization for Nuclear Research (CERN) and published online on August 6, 1991. The technology protocol behind the Web served computer browser development, where text and visual content would be presented on a graphical user interface, ultimately providing a user-friendly experience of the Internet. Through browsers, the Web allowed anyone to publish virtually anything, revolutionizing information communication for years to come (Kovarik 2011: 294–295, 305–306). The World Wide Web revolutionized the use and sharing of information in an irrevocable way. The development, which seems so obvious today, demanded an incredibly creative mind at the time, as Berners-Lee stated:

> *"It was impossible to explain to people what the Web could be like then, and now when you talk to the millennials, they can't understand what the problem was."* (Savage 2017: 21–22).

The rapid and unexpected development of digital technology requires successful timing for functional compatibility between technologies (Zittrain 2008: 3813), as well as an equivalence in the perception of people's desires and a device's offerings (Immonen & Sintonen 2015: 589–590).

From ubiquitous, ever-evolving connectivity to hardware development, digital progress continues to compress digital artifacts into ever smaller units while at the same time increasing the efficiency and effectiveness of computer processing power, storage capacity and communication bandwidth, which when combined create ubiquitous computing (Yoo 2010a: 215). The availability of powerful computing technology with wireless connectivity links devices, systems and people, creating interconnected networks able to process topics of shared interest. Sensor technology represents technological artifacts that describe possible add-ons, showing how the progress of digital technology continues to enhance ever-growing networking possibilities. As a digital monitoring device, sensors can be placed wherever necessary or desired to provide a wide spectrum of information for later analysis. In conjunction with the digital network, sensors can broadcast information about the location and status of personnel, perform traffic monitoring, and provide information about people's vital signs and other health concerns (Zittrain 2008: 3813–3816).

The technology involved in the ongoing digital transformation has connected information in the form of data from every aspect of life, making the interrelationship between data, digital technologies, and people the core of the current evolution of information age. Digital processes enable effective gathering, storing, discovering, sharing, and securing of data, which facilitates limitless possibilities and resources for data analysis and insight. The amount of, and easy access to, this so-

called Big Data opens possibilities for new knowledge and deeper understanding of data-related activities. Despite all these offerings and advantages, it is people's engagement with and commitment to the digital means that ultimately enable the full use of the current technologies, making people the essential part of the process (Ashwell 2017: 393–394, 398).

Overall technological development has reached the point that objects' physical requirements are being pushed aside; digital development is creating artifacts whose functionalities are embedded in a pervasive and unnoticeable manner. The evolving digital materiality is changing the nature of technological artifacts, as software solutions can be embedded almost anywhere. Digital content exceeds previously restrictive physical limitations and brings multiple new functionalities to physical objects. Advanced software development creates solutions that can present precise digital representations of physical actions and analyze the nexus between different variables in real time. The embeddedness of the functions, calculation power and communication effectiveness of digital solutions creates huge possibilities for content and solution creation for services, processes and products (Yoo, Boland Jr, Lyytinen & Majchrzak 2012: 1398–1399). As the features of evolving digitalization broadly affects its surrounding by altering organizational structures both internally and externally, reconfiguring services in ways that impact social interaction in them and producing new digital artifacts with expanding capabilities, it is not unjustifiably referred to as a megatrend of our time. The constantly changing impact of digitalization demands holistic considerations of the generative change that it produces. The impact needs to be addressed among the technical capabilities producing it, but also as our abilities to process and understand all the affordances and constraints that come with it increase (Hurtta & Elie-Dit-Cosaque 2017: 2744–2745).

2.5   Citizens of the digital era

Computer technology appears complicated and even intimidating to some. Digital devices are embedded with functions that may be both blessing and curse. Multiple functions can appear confusing and off-putting without a proper education or interest in technology. Digital technology should attract users. Attraction can be achieved by a pleasant user experience, by offering desirable outcomes, through an easily approachable and intuitive user interface, or via all three combined. As a result, features whose benefits outweigh the effort required to use them generate an acceptable, and accepted, user experience (Negroponte 1995: 89–92). Previous rapid technological development already proves how quickly and unpredictably technological achievements can capture our use and attention. The future will

surround people with ubiquitous technology as it connects people and devices. The growing integration of digital artifacts, aiming for seamless usability and ease of use, allows very little space for learning all the related techniques and technical know-how (Maceli & Atwood 2011: 103).

Despite all the challenges, digital change offers us the opportunity to design our work, services and products in a way that exploits our true potential as humans and empowers us to use our unique abilities and skills. The potential of technology to take charge of certain tasks and procedures frees humans of these often dull and repetitive actions. Therefore, partnering with technology allows people to free their minds for more creative use, in complex problem solving and social interactions that machines are not able to master (Bajer 2017: 91–92). But understanding the world around us is a requirement of the ability to interact with it. Evolving digital technology builds a world of ubiquitous information and communication technology, where interconnected digital devices interpret, understand, and respond to human requests and actions. A consequence of progress is the challenge to keep up with it and to engage in changing interactions with each other and with the digital entities around us (Rodden 2008: 3837).

In the digital economy, where achieving success relies on capturing, analyzing, and using available data wisely, understanding grants the ability to respond in a desired way to new insights (Ross, Beath & Quaadgras 2009: 90–91). In today's changeable and speed-driven economy, success is achieved by using the assets of information and knowledge. Knowledge appears a troublesome concept to define but it assembles data, personal beliefs, perspectives, experiences, experts' insights, and contextual information among other factors into a package that has become the principal determinant and primary factor of competitiveness and productivity in our time (Tzortzaki & Mihiotis 2014: 29–31). The meaning of knowledge and information becomes clear in organizational context as pioneer thinking and doing produces the required advantage of novelty for organizations. Creating new knowledge or doing something for the first time provides a critical understanding of the surrounding phenomena. Holistic insight generates unique understanding, which then becomes leverage when building organizational, as well as personal, competitiveness (Woodman, Sawyer & Griffin 1993: 293–294)

Along with the multilevel integration of digital technologies, the use of information and knowledge is in constant transition. Digital change is in interplay with multiple levels of society, affecting people in all of their environments. Reinforcing the characteristics of changing work culture is the emergence of mobile knowledge work, which is increasing as the developing digital technologies enable mobility across spaces, times, and organizations. The liberation of work practices is a

consequence of the emergent discoveries that utilize the achievements of digitalization. Successful exploitation of digital possibilities reflects a good and holistic understanding of the affordances the digital artifacts enable (Nelson, Jarrahi & Thomson 2017: 54–55).

2.5.1   The ecology of artifacts

As technology becomes ubiquitous, digital content captures people no matter their physical location and without respecting temporal differentiations between work and leisure. The seamless integration of technology is removing the separation between work and leisure, which decreases the distinction between the two and merges these states together. Thanks to the seamlessness of technology, work both protrudes into and has become accessible from different spaces at various times. The change within digital transformation is obvious in work structures when the limitations of time and space have disappeared, but the effects have multiple dimensions that each return to the changing nature of knowledge and the utilization of information (Bødker 2016: 533–534). Although technological artifacts provide their intended use to people interacting with the object, those interactions become more complicated when technological artifacts can support multiple operations. Multidimensional use can overlap between different artifacts, giving the user the ability to divide and continue the desired activities interchangeably between different devices. This digital interaction is shared over multiple devices designed to be seamlessly connective, from mobile devices to laptops and desktop computers all connected to support the activities and abilities of the user (Bødker & Klokmose 2011: 315–324). An individual's use of technological objects forms an ecology of artifacts, where the technologies communicate with each other, exchange information and share content in a network. The ecology of artifacts connects users to the network, with each operating and utilizing the artifact functionalities from their subjective point of view (Bødker & Klokmose 2011: 321–322; Vasiliou, Ioannou & Zaphiris 2015: 59–60; Jung, Stolterman, Ryan, Thompson & Siegel 2008: 201).

Here the term ecology is borrowed from Gibson's (1979) ecological approach to visual perception, in which he used the term to form his introduction to the concept of affordances (Bødker & Klokmose 2012: 448; Jung et al. 2008: 202). In Gibson's view, our perception is guided by the ecological relationship between an object and the interpreting subject (Gibson 1979: 1–4). The ecology of artifacts functions as a perspective from which to understand the complexities surrounding the reciprocal interactions in the network of artifacts, combined with the effect of human influence (Jung et al. 2008: 201). With an understanding of the ecology of

artifacts, the perception of existing possibilities and functionalities broadens and becomes whole (Bødker & Klokmose 2011: 316–317).

Computer-based artifacts function as mediators of certain tasks, which draws the focus of their interaction in different directions: towards the user, the task and to the artifact itself. As we operate these digital artifacts, our increasing understanding of their multidimensional uses and features for each interface broadens our perspective, providing a better sense both of the influencing forces and the developmental needs (Bødker & Klokmose 2011: 321–324). Since people's understanding of technological artifacts is related to their ecology of artifacts, the knowledge about artifact functionalities become highly dynamic in a relationship of understanding shared with other users. The use of an artifact also comes with different dimensions depending on the context of its use as well as the background and characteristics of the individual. Our surroundings, along with the arrangement of people and mediating technologies, influence our thinking; an artifact cannot be understood in isolation but only in the context of the environment and other users (Bødker & Klokmose 2012: 449–450).

From the ecological perspective, products have various interactive dimensions, which relate to their use and influence the understanding of the artifact (Jung et al. 2008: 202). Forlizzi (2007) specified the dimensions of product ecology as affecting people, activities, places, and the social and cultural contexts of the artifact. Generally speaking, ecology refers to the sum of independent factors that form an interacting system with a particular relationship between its interrelated parts. People affect by their behavior the dynamic of the ecology, which is guided by their attitudes, dispositions, norms, values, and relationships. Similarly, place influences the functioning of the ecology, from its structure to its routines and the social norms that unfold there. 'System' contains the product dimension as well as the designed activities and the social and cultural context of use, all of which characterize the use of an artifact, its function, and the aesthetic, symbolic, emotional and social responses that they produce to the mind of the observer. The interrelated factors within the ecology reflect the how multiple characteristics unfold to encapsulate the perception and experience of a product (Forlizzi 2007: 131–132).

Utilizing detailed knowledge and experience with a full understanding of the local peculiarities, whether structural or social, and with the ability to consider the primary and secondary effects, reveals strong ecological embeddedness and a holistic understanding of one's surroundings (Whiteman & Cooper 2011: 892–993). People within the same ecology develop different interpretations of the artifacts according to their experiences, and their reactions, attitudes and emotional responses reflect this individual perception (Forlizzi 2007: 132). Whiteman &

Cooper (2011: 892–893, 908) suggest that after achieving full ecological embeddedness, actors possess a level of awareness that makes applying knowledge produce expert sensemaking, as the ecology-related knowledge, experiences and expertise are applied to the solutions. In this sense, collective sensemaking increases the opportunities to reveal critical expertise, thus bringing value to decision-making as previous mistakes or existing pitfalls can be avoided.

Before forming a collective consensus, people need to be willing to adjust their thoughts and reform prior understanding (Nabatchi 2010: 386–387). Overall, our understanding presents itself as a complex combination of factors that we perceive around us and connect through thinking and observing with the knowledge, experiences, and insight that we possess (Morrison & Rosenthal 1997: 125–126). The thought process guides mental models, which represent a concept that clarifies existing understanding with a causal relation between variety of information and knowledge. We ultimately form our understanding through the constructs of our minds, which are created according to our perception of the world around us (Mumford, Hester, Robledo, Peterson, Day, Hougen & Barrett 2012: 311–312; Johnson-Laird 1983: x). Knowledge appears in many forms and is influenced by variety of operations such as problem solving, idea creation and evaluation. Understanding the relationships between different forms of knowledge and information builds the ability to gain greater understanding, which relates back to the individual skills and abilities used for predicting and explaining our surrounding events (Mumford et al. 2012: 311–312).

The individual structure of knowledge in our minds, so-called mental models are usually formed for a specific task or knowledge domain. However, as the surroundings change, our knowledge structures also need to be updated to match. Steady environments allow functioning according to previously learned habits and makes operating more straightforward and indeed carefree for people. Since our surroundings are in constant flux, whether an organizational environment or a societal setting, the situations require constant change and adaptation from people. Many times, the demands of change provoke reluctance since they require adaptation and the changing of established ways. Previous methods are often defended on the basis of prior success and changes toward something new and uncertain bring up feelings of uncertainty and discomfort, which in a work setting relate to dissatisfaction and lower motivation (Uitdewilligen, Waller & Pitariu 2013: 128–130, 148). It has been shown that mental models can act as restricting mind structures, but with open-mindedness our cognition can be directed toward liberating mind structures. Two people observing the same phenomenon can result in diverse results, just by observing the event from different perspectives and detecting different details. Two people can generate a broader view of the world by

understanding the existence of diverse mental models and connecting separate understandings. Therefore, the full use of knowledge requires the ability to reflect openly on all the complex details our surroundings provide (Senge 1992: 5, 7–9).

2.5.2 The changing balance of information and expertise

The role of information is changing with the development of digital technology. Where previously information was valued as a utilized by-product of a physical product, the new paradigm prioritizes it. The way digital technology is constructed allows users to modify, create and exploit information flexibly. The programmable nature of digital information allows software solutions to be created in any way users desire, and the physical computer hardware functions as an enabler of novel digital content. Information is consumed and created in a constantly changing ways: where once newspapers were the medium for broadcasting and sharing local and global events, nowadays digital information is consumed immediately through social media channels (Yoo & Euchner 2015: 13–15). The pervasiveness of digital technology brings media content to people on multiple fronts but also gathers multiple user experiences together, converging previously separate functionalities into one handheld mobile device, smart television service, etc. Information use also finds new dimensions in the information exchange between the user and the technological artifact. Wearable smart technology demonstrates this reciprocal human-computer interaction when digital sensors are placed on runners' shoes to guide the exercise, or when mobile phones provide user-tailored information through a variety of software applications (Yoo et al. 2012: 1398).

Digital technology supports the highly dynamic creation of information as new capabilities can be added in post-production. All-new functionalities can be added and redesigned with software updates to processes already operational. This pervasive and reprogrammable nature of digital information enables content consumption and recreation according to user's preferences and evaluation, which emphasizes the role of users. Through the dynamic nature of digital information, digital transformation requires organizations to constantly renew their operating structures to meet evolving requirements (Yoo et al. 2012: 1398–1400). While ongoing digitalization influences organizations and societies, similar effects affect people in a sociotechnical manner. Organizations, whether private or public, need to take current technological advancements into consideration when creating organizational objectives and strategic models. Equally, dynamic changes in the operating environment challenge organizations to adjust their operations and find resilience during turbulence (Rochet, Keramidis & Bout 2008: 65–66). The change in organizational culture also brings the requirement to learn into employees' and

customers' skillsets in multiple ways. While service delivery moves more in the direction of customer guidance, methods of doing so are becoming more and more digitalized. Constant learning is therefore required both to perform needed actions and to gain technical know-how (Svejgaard Pors 2015: 184). While technology continues developing and bringing new solutions and customer needs to be evaluated, ultimate organizational success demands holistic consideration and constant reinvention and transformation of operations (Reddy & Reinartz 2017: 15).

The way social media technologies create co-production and co-creation movements with Internet capabilities and mobile access is replicated in the demands made of organizational settings as well. Organizational governance and culture are at the forefront of reforming operating policies to meet new digital era requirements, which present as more real-time coordination through social media platforms; a broad, digitally networked set of actors; and information transparency (Margetts & Dunleavy 2013: 11). For the customer, digitalization creates greater transparency in decision-making and operating processes. Information availability lowers the knowledge asymmetry between experts and customers, while at the same time enabling stronger participation from the customer with the benefit of better and more convenient services (Reddy & Reinartz 2017: 14). Information availability transfers to organizational employees in a way that makes previously unreachable knowledge accessible, enabling a broader set of employees to participate in decision-making processes, and enabling and empowering employees with new opportunities while also giving them additional responsibilities and obligations (Margetts & Dunleavy 2013: 7).

As the digital means are utilized so as to derive benefit from their qualities (i.e., faster and better communication; efficiency in information and data management through digital data processing; and storing, retrieving and transferring data sources), the features promote the transparency of organization and management processes but also build customer awareness about the issues being addressed. The improved interaction between actors and the citizen sector also aims to fulfill organizational objectives whether in revenue and cost efficiency or in citizens' interest (Sunita & Narang 2014: 6). Electronic delivery changes the role of the customer in public services. Moving to e-governance authorizes citizens in regard to their own matters, shifting the bureaucrat from authority to facilitator. Changing the role of the public service worker requires rearrangement of the mental model of the work duty in question. Changing the balance of power demands acceptance from the citizens as well as the public employees. Simultaneously, experts become generalists while tasks are changing and in turn employees gain a more holistic view of the organizational environment (Svejgaard Pors 2015: 181–184).

Transparency promotes a self-administration movement in which citizens and users take a more defined role in addressing their issues via electronic service delivery (ESD). The shift towards the self-service ethos is a result of the impact of the Web, the Internet and emails making content production into coproduction. Services are more and more produced in combination with the citizens or the service users, with a strong emphasis on the customer-centered approach enabling agile and direct development of services meeting needs and interests. The self-regulation of services transfers the balance of decision-making towards the user: the changing role and ideology necessarily contain a special learning curve and opportunities for failure (Dunleavy, Margetts, Bastow & Tinker 2005: 486–488). Digital transformation contains many aspects that must be overcome before the total inclusion of digital technology. The skills and interests associated with digital technology and the accessibility of digital services and connections shape the digital divide and exclude parts of society from the technology's services (McNutt 2014: 65).

However, overall, the digital change encourages new approaches to the development of public sector organizations, requiring changed mindsets, cultures, and characteristics in organizational governance. The digital effects aim to reintegrate public sector processes, with stronger partnerships and the simplification of services and organizational policies. A needs-based approach to the development of the service system to meet upcoming requirements with greater agility and in real time will utilize the customer perspective effectively. Public sector organizations must adapt holistically to digitalization, providing service delivery and processes via electronic means wherever possible (Margetts & Dunleavy 2013: 6).

2.6   Discourse about digital service design

Considering what digital development offers service and product delivery, it is worth looking at the nature and appearance of services, both in general as well as with regard to digital considerations. To begin with, it is important to understand the nature and appearance of the elements within the service interaction and process delivery. Services are easily seen as a self-occurring event without a clear structure for development, rather than as a value-adding asset. This often causes service development to appear as a neglected asset in the organization environment (Menor et al. 2002: 136). For tangible product delivery, the service interaction becomes appreciated as the differentiating factors between products easily diminish and goods become generalized, less distinguishable commodities. This gives service a more prominent role as a value-identifier for the end user. The customer value perspective redirects focus on the advantage conferred by services and

emphasizes service orientation as a meaningful strategic approach for organizations (Edvardsson et al. 2006: 3).

Service delivery consists of multiple assets of tangible and intangible characters, which need to be fluently integrated into the delivery processes for a quality outcome. Much of these intangible service processes depend on the skills and characteristics of people, which emphasizes the value of the information and knowledge that the relevant actors possess and share during the service process (Goldstein, Johnston, Duffy & Rao 2002: 121–122). This makes the services appear as something experienced rather than something that can be possessed, which physical objects allow. This subjective aspect of services defines them as multidimensional, each person experiencing the services uniquely from their own personal perspective. The complexity of services increases the confusion over the right path for service development, when services include multiple crossroads for possible decisions, as well as variable methods within the service process and alternative courses of action for everyone receiving the service. This description stresses a development challenge for services, when identifying and solving problems and recognizing possible opportunities often occur only after trial and error (Shostack 1984: 133–135).

Despite the uncertainty and challenge related to creating and organizing a successful service, the importance of customer satisfaction has placed an emphasis on the development of services (Johnston 2004: 129; Menor et al. 2002: 136). As the meaning and value of services has become prominent and the nature of services manifests in multiple aspects, the development of services benefits from a structured process. The concept of new service development (NSD) provides a structured framework with the features required to understand holistic service development (Santos & Spring 2013: 800–801; Storey & Hughes 2013: 834; Papastathopolou & Hultink 2012: 705; Johne & Storey 1998: 184–186).

Customer orientation (Edvardsson et al. 2006: 4) as well as supplier involvement (Hull, Edvardsson & Storey 2006: 288) in the development process together form a key principle of new service development, where the value of service delivery is acknowledged to accumulate from the increased understanding of the target group. That being said, the increased involvement of customer opinion also includes a risk of failure, when engaged people lack expertise about the context or are not informed enough to harness their creativity during the innovation process. Simply asking for development features easily results in a 'wish list' of incremental upgrades and ultimately a failure of the desired novel innovation. Developmental responses and opinions require delicate interpretation for the detection of the true meaning underlying them (Ulwick 2002: 91–93).

Current evolving technologies enable the global networking of people as well as their broad involvement in content creation (Edvardsson, Gustafsson, Kristensson, Magnusson & Matthing 2006: 3). At the same time, the spreading digitalization opportunities are changing consumers' behavior, as TV gets replaced by the Internet, and social messaging and emails replace face-to-face interaction. Feedback consequently needs to be gathered from the online platforms (Jaakkola, Aramo-Immonen, Henno & Mäkelä 2106: 1025). This evolving trend shifts power away from the company and towards the customer, and emphasizes the importance of user orientation in the development processes (Edvardsson et al. 2006: 3). The benefits of service development relate to profitability and to maintaining current customers as well as attracting new ones; they also lead to creating new service markets through innovations. The surrounding phenomena of globalization and technological development creates an environment for new service needs, but the ongoing transformation also creates developmental possibilities for new service and technological innovations (Menor et al. 2002: 135–136). In all cases, interactions within the processes require particular attention to produce quality outcomes. From the service development perspective, high technology product development requires just as much effort to be given to the supporting technical guidance and customer assistance as to the development of the end product (Johne & Storey 1998: 185–186).

While the main ethos for service delivery is the production of quality outcomes that meet the needs of customers and create satisfied, loyal and long-lasting customer relationships, the objectives and means vary according to the service sector and operating strategies of the provider. Public health care service, for example, has different objectives for its services than a comparable private sector business, which can simply concentrate on satisfied and profitable customer relationships. While objectives can be simplified to meet customers' needs for a fulfilled and satisfied user experience, the execution of the service delivery often becomes multidimensional and multi-faceted for involved stakeholders. Depending on the field of service, the processes also need to be organized according to the guiding requirements of legislation and ethical or environmental rules and restrictions (Jung, Lee & White 2015: 2–5).

Despite its complex nature, effectively running public service sectors is highly important as the service sector makes up a substantial portion of the societal economy and offers employment growth for the 21st century (Papastathopolou & Hultink 2012: 705; Menor, Tatikonda & Sampson 2002: 135).

2.6.1 The nature of services

Focus on service development requires an understanding of the characteristics of services. The nature of services differs from that of tangible goods produced in the manufacturing industry. Given the lack of clear encoding or formatting of the product as well as the uniqueness of each service transaction, services appear more vague than tangible goods. Services possess qualitative aspects and personal values that interfere and affect the process of service delivery. Supply and demand constantly evolve alongside service interaction, which brings uniqueness to each service encounter and distinguishes services both from products and each other (Ferraz & de Melo Santos 2016: 252). Data, information, and knowledge appear as those intangible goods, which service incentives are built on. This realization reveals the necessary understanding that revolves around the distribution, utilization, and guidance of services (Hipp & Grupp 2005: 518). Their intangible character frequently allows services to be highly tailored to meet customers' needs, and their content is constructed during the reciprocal interaction guided by the knowledge, experience, and professionalism of the service providers (Durst, Mention & Poutanen 2015: 66).

Services provide the connection between different parties and accumulate shared value throughout the interaction process. One characterizing feature of services is that the outcome of the service value forms over the entire service process, making it divided over the whole delivery process (Goldstein et al. 2002: 121–122). Service offerings mostly appear as intangible, rather than physical, products. The service product is mainly offered in a process of one or many encounters, each building the outcome of service delivery (Johne & Storey 1998: 187–188). Service packages illustrate this intangible nature when offerings are provided in a package based on the customer's needs and wishes (Goldstein et al. 2002: 122). Within the service process, the delivery can be observed in widths and depths, which refer to the extent of the offered service option. Width refers to the alternative delivery options (i.e., process lines) and depths are the various options within each delivery line (Cowell 1988: 303).

Knowledge is a crucial part of services, appearing explicitly as a different form of data, and implicitly as tacit knowledge of individual human capital accumulating from experiences, values, contextual information, and professional insight. The necessary interactions among services distribute knowledge, making it a social process with the challenges of understanding each experience, value, context, and professional insight (Tzortzaki & Mihiotis 2014: 29–31). The intangible assets on which the services are based rely on various sources of mentioned data, information, and knowledge (Hipp & Grupp 2005: 518). As services are mostly operated

by interaction, the outcomes are delivered without the opportunity to evaluate the offering beforehand, in which case the client needs to rely on the opinions and attitudes they formed with previous experiences. Even though services might include some tangible offerings, the ultimate supply of service remains something intangible (Cowell 1988: 304).

Due to the complexity of the service delivery elements, services need to be viewed from multiple perspectives, as do products. Otherwise, how can they deliver the utilization of the intendent use? What characteristics do they have as qualities and how are the delivery processes organized to meet the needs of the expected target group? Each of the perspectives affects the service as a whole, and the crucial characteristic of "separability of each step" defines the overall service operation. Their intangible quality and the knowledge capital behind services also demonstrate an important feature of services: being non-physical, they therefore exist without being archivable (Gallouj & Weinstein 1997: 539–540). De Jong and Vermeulen (2003: 844–845) as well as Johne and Storey (1998: 187–188) explain in their literature reviews the nature of services through the characteristics of intangibility, heterogeneity, simultaneity, and perishability. The characteristics demonstrate the abstract nature of services and clarify the differences compared to more tangible development. Cowell (1988: 300, 304–306) continues the list of distinguishable features with the properties of inseparability and ownership. Characterizing features enhances the understanding of services by offering vital perspectives for consideration concerning the service development processes. While the steps of the service development process might vary, the bottom line remains the same: to develop as many good ideas as possible and to implement the most valuable. Within the development process, the requirement for deep knowledge and understanding of the target market, timeframe, and resources, along with the nature of the service itself, cannot be overstressed.

One challenging aspect of service development and measuring comes from the heterogeneity of the process and outcomes. Services are not easily comparable across sectors as the inputs and effort vary greatly between services. Therefore, in the operational and efficiency comparisons the distinguishable sectoral features should be accounted for to gain accurate results (Kuester, Schuhmacher, Gast & Worgul 2013: 533–534). The heterogenous nature of services is shown through the whole organizing and execution process for services and it presents a challenge to their development and delivery in multiple ways. While organizations need to employ different technologies, methods, and skillsets to deliver quality services based on clients' needs, the execution differs slightly for each customer interaction based on the individual characteristics and needs of both the customer and the service personnel. The heterogeneity of services challenges any kind of generalization of

structure for service development and innovation creation. But by the same token, it liberates and gives more opportunities to creative development (Evangelista 2000: 186–191).

The service delivery resources are based on the physical assets and the employees, where physical assets include facilities, equipment, land, etc. Employees, on the other hand, contribute to the service their knowledge and experience capital, and their relationship skills. Combined, these qualities cause the manual and intellectual work to be performed (Santos & Spring 2013: 803–804). The nature of the services I have just described demonstrates how services are typically produced as they are consumed, which gives them the feature of simultaneity. Services, being the outcome of human resources, are also not storable, which confers on them the feature of perishability (Johne & Storey 1998: 188).

The key feature of inseparability defines the nature of services as it explains the relationship between the service production and delivery. The feature of inseparability characterizes both the nature of services as well as their value formation. Among services, no matter what delivery, development or design features they have, the interrelated connectivity of actors and issues affects the outcome in each step of the process. The value of services is defined by the input from all the involved actors and the process as well as the development of services under the influence of organizing parties. Through the value of inseparability, meaningful views should be heard from around the service process from personnel at each step of the delivery and development. Service development and value formation rely heavily on the joint and reciprocal commitment of service providers, as the overall input translates to the delivery process and to the outcome of the service from each actor (Hull, Edvarsson & Storey 2006: 288).

2.6.2   The digital side of services

On organizational and societal levels, the developing information and communication technology (ICT) possesses a substantial role governing how services are structured, organized, and delivered. ICT solutions operate on multiple levels influencing the employee, product and service interfaces. The Internet, e-mail, social messaging and overall development of IT systems have changed the interaction between different parties and distinguish the current changes revolving around organizational and managerial processes. In general, the development of IT and information systems have a major role in how public services are organized and delivered to citizens and customers (Dunleavy, Margetts, Bastow & Tinkler 2005: 468, 478). The effects of technological development and the extent of population growth are currently the distinguishing features affecting life and work, as well as

influencing people and their surroundings on global and local levels (Robinson 2011: 6). The continuous change in the environment, whether in organizations' operating environments or individuals' everyday surroundings, has become noticeable and factors such as rising globalization, increased competition and changes in technology bear a major responsibility for the change (James & Drown 2012: 17).

Businesses and services have experienced so great an effect from the developing information technologies over recent decades that the impact of technology has become a widely acknowledged issue. Technology profoundly affects services that have commonly relied on a strong face-to-face interaction between the provider and the customer. This is where the new digital possibilities change the perception of services, the means of service delivery and the directions of future development (Meuter, Bitner, Ostrom & Brown 2005: 61). During this digital change, people's relationships with their mobile devices and online networks has grown stronger, as they are handling social interactions with friends and family, and professional relations with work and different institutions, via digital means. Behavioral changes and growing expectations for digital interaction increase demand for service providers to adapt to the digital era (McNutt 2014: 50–51).

As Internet 2.0. is in development, the public sector is taking its digitalization leap, as Valle-Cruz, Criado, Sandoval-Almazán and Ruvalcaba-Gomez (2020: 1) explain when discussing the utilization of artificial intelligence. Public administrations seek to gain faster, more efficient, precise, transparent, and responsive operation of its citizen-orientated services from the digitalization opportunities. Criado and Villodre (2021: 253-254) agree with the digitalization aims as they emphasize in their assessment of public administration digitalization achievements in transparency; they especially highlight the participation and collaboration gains to be made by taking advantage of social media platforms. Valle-Cruz et al. (2020) used their study to investigate the possible effects of AI on the delivery of public policy, as it has been shown to possess potential to enhance different aspects of government actions, such as processes, interaction with citizens, service delivery, decision-making, and public policy design and evaluation. Criado and Villodre (2021) examined Web 2.0. platform opportunities for public service delivery. Digitalization possibilities undoubtedly hold opportunities for public administration development, and the public sector as well as many others present clear developmental aims that could benefit from capturing the digitalization opportunities.

In the Finnish context, the governmental action (Ministry of Finance 2021) of putting together a ministerial working group on Developing the Digital Transformation, the Data Economy and Public Administration reflects that digitalization's urgency, critical point of view and potential responsibility requires a response. The

activity represents one of many to support the wide-ranging development of the digital transformation. Another example is the recommendation on Broadband Development given in 2004 by the Organization for Economic Co-operation and Development (OECD), later renamed the recommendation on Broadband Connectivity (OECD 2021). The existing and lasting attention paid to the digital transformation clearly shows its vital nature for countries' economic and societal wellbeing.

Through the use of online tools and social media applications, digitalization holds enormous possibilities for the public sector, for example in the engagement of citizens in governmental decision-making and service design. Digitalization facilitates the link between citizens and governmental actors, supports stronger participation for the citizens and enables collaborative content creation in participative designing and development of administrative processes. Comprehensive digital engagement requires a holistic approach that executes digitalization strategies that obey the built-in principles of digital interaction and ecosystems. Thus, the overall success of digital transformation requires fundamental consideration of the organizational, cultural, and administrative operations; and most importantly the willingness to learn away from the familiar, along with being ready to welcome new practices (McNutt 2014: 49–51, 57, 63). The holistic and vast scale changes build new requirements for learning and innovations for services and products. The changing demands within organizational structures and people's desires produce new needs but also require the abilities to imagine new services, invent new opportunities and acquire the skills to adopt them (Robinson 2011: 6, 11–12; Oldham & Da Silva 2015: 7).

Due to the nature of technology, technological solutions can often act as the driver for change and constant development. The novelty that technology provides can be seen as a major source of innovation as the solutions enable the easy creation and testing of new combinations (Bekkers 2012: 331). As with most new introductions, novel digital creations can easily provoke ire as they would introduce a learning curve for their users and may be controversial in appearance. That said, digitalization's charm is in its ability to customize appearance and functionality as liked and allow the user interface to be designed to please the end-user. The freedom of the design allows the digital solution to enclose novel and advanced functionalities within a known appearance already familiar to users, as Hadzic and Chang (2010: 781) emphasize in the case of electronic medical solutions. In 1996, Simon (1996: 17–21) prefigured how this technological reality would function, so that the computer with its hardware and software solutions would provide artifacts that have only a minority of their actions visible to their users. The internal operation of the computer usually runs on a need-to-know basis for the common user,

who just wants the artifact to execute the desired operations and does not need to understand the technicalities related to the requests. Achieving the expected or desired outcomes depends ultimately on the perception that the user gains from the creation, as Norman (2013: 5) explained:

> *"When done well, the results are brilliant, pleasurable products. When done badly, the products are unusable, leading to great frustration and irritation. Or they might be usable, but force us to behave the way the product wishes rather than as we wish"*

As described, the development of digital artifacts and solutions involve challenges but also offers the creative freedom to provide the functional combination of methods that can serve people's needs and requirements in the delivery of digital solutions (see Bødker & Klokmose 2011). Technology may promise potential advances on many fronts, making life more enjoyable and enhancing efficiency and productivity, as the quote above suggests. The ongoing evolution of digital artifacts is constant and rapid as developers add new functionalities to their devices. The added functions easily result in increasing the complexity of these artifacts, complicating their control and usability for the end user. At the same time, these digital opportunities provide a potential for creativity even as they create design challenges for usability. Novelty is therefore permanently in competition with ease of use or other factors that arise from the user's desires, such as affordability, reliability, attractiveness, or other emotionally related aspects such that the product needs to be distinguishable from, and superior to, a competitor (Norman 2013: 32–36).

The digitalization of workplaces introduces an iterative reformation of work products, practices, service delivery and procedures with the aim of finding originality and a potential advantage for organizational effectiveness (Oldham & Da Silva 2015: 5). Novelty presents itself as a key factor of success, applying not only to organizational aims but also to individuals and societies (Soriano de Alencar 2012: 87–88). Despite the promise held by the digitalization of services, the change of service delivery also carries significant risks. The transition needs to be orchestrated comprehensively to utilize the full benefits, and the successful adaptation requires a forecasting of changes and active responses to remain flexible and withstand risks (Reddy & Reinartz 2017: 16–17).

This is why the key features of digital innovations do not lie solely in novel technology but rather in the comprehensive view, where user satisfaction and experience have a meaningful role. Satisfaction in novel digital solutions and services can be earned by meeting or exceeding the user desires and expectations. The successful approaches appeal to the general human psychological aspects that create fascination and delight in use for the product or solution. Attractiveness, whether in

usability, user experience or aesthetics, promotes the joy of use and fascination toward the object—qualities that are often neglected but turn out to influence strongly the adoption of the solution, before, during and after utilization (Zagel & Bodendorf 2012: 697).

2.6.3 The user-centered design approach

As the increasing production of digital content changes how people interact, it becomes ever more vital that this growing dimension of human-computer interaction achieves the attention it needs to ensure a functional and satisfying user experience. A user-centered approach in development focuses on bridging the gap between user abilities and digital-era device qualities (Ritter, Baxter & Churchill 2014: 33–34). Digitalization presents qualities and tasks that appear differently to different people. Based on their technical knowledge and experience, interest, or motivation, some see opportunities, some see challenges, and some see annoyances. These outcomes require attention to be paid while new technical systems are being developed and introduced, because it is ultimately the individual's social capabilities and needs that define the use of artifacts, and therefore human needs should be prioritized over technical qualities in the creation of digital artifacts, services, and solutions. Even though the socio-technical aspect was first discussed over 60 years ago to consider work situations in the mid 20th century, the main principle of emphasizing user appreciation remains valid for development activities (Mumford, E. 2006: 317–321).

To consider the functionality and performance of technological system that commonly operates on multiple levels, and which contains interaction on different interfaces either between the technological artifacts themselves or between a human and a computer, always requires some sort of human dimension. The human connection highlights the existence of socio-technical aspects and the importance of the human-centered approach for technological development (Shin 2014: 521). From the beginning of the 1990s, as Gaver (1991:1) describes, the feature-packed characteristics of technology provided a multipurpose functionality for users but often also came often at the price of less capable functionality for any individual task. Technological achievements have tended to provide aesthetically pleasing or feature-rich solutions, which might still be functionally awkward for the end user, resulting in a poor user experience. Paananen and Seppänen (2013: 723) emphasize the aim of having customer values that are met by capturing existing expectations. The researchers conclude that value is gained by creating and delivering desired experiences but also by successfully assessing and managing the customer and user group evaluation.

Design means creating value for its beholder, and the design of an artifact can represent differing objectives for users and for the manufacturer. Considering the essence of an artifact, the desired value can be achieved from diverse qualities like its form and materials, its understandability, and its usability; or from the emotional impact of the solution. Different design fields concentrate on different aspects, as exemplified by the disciplines of industrial design, interaction design and experience design. It becomes obvious that design balances multiple forces, and when it successfully results in a good design the outcome can provide a pleasurable product or an enjoyable user experience. Alternatively, a bad design can provide the opposite and lead to total frustration or an undesired requirement for behavioral change (Norman 2013: 4–6). Norman (2013: 27–28) continues with the example of a solution as simple as scissors, which advertise their use with a single glance. The blades indicate cutting and the holes in the handle point clearly to where to insert fingers. The advanced version of scissors even indicate a differentiation between right-hand and left-hand use, with the formal design of the handle. The appearance of a product thus influences the way a product or a service should be (and ends up being) utilized.

Through their elements, design choices influence the attitudes and direct the behavior of the observing users. Good design attempts to take the user's desires and requirements into consideration and deliver quality solutions that end up promoting customer satisfaction and serve the essential intentions of the product or service (Udo, Bagchi & Kirs 2010: 481). Based on its aims and solutions, the design can impact people in multiple ways: one person might experience irritation at the usability of an object, another might express satisfaction and delight at the appearance of an artifact, and another might become enthusiastically anxious for an expected product order to arrive (Desmet & Hekkert 2007: 57–59). Desmet and Hekkert (2007: 57–59) continue by explaining how the design interaction affects and causes experiences according to the nature of the encounter. The outcomes appear as something pleasant or unpleasant and create an active or calm reaction in us. Figure 5 demonstrates the spectrum of emotions about the experiences that a design can deliver.
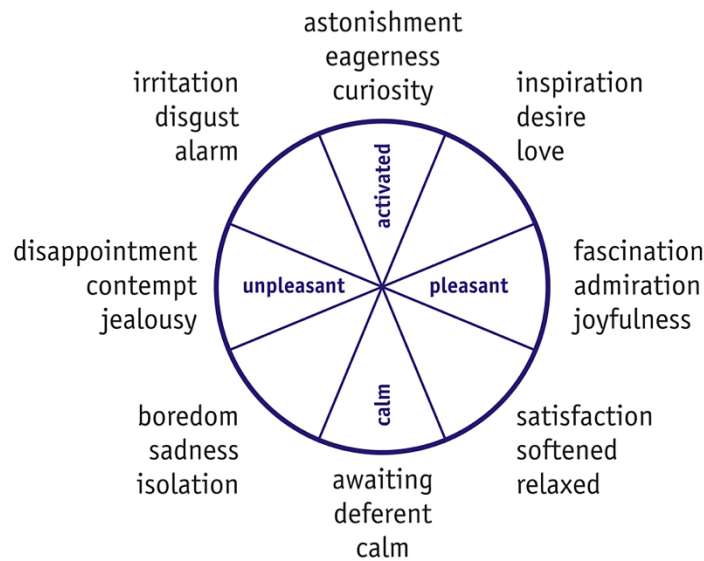
Figure 5. Circumplex model of core affect with product-relevant emotions
(Desmet 2008; adapted from Russell 1980)

A product is perceived subjectively, which results in diversely perceived experiences of the functionality and qualities of the design and the senses or the feelings and emotions that it awakens on us (Desmet & Hekkert 2007: 57–59). The diversity among people, whose variety of minds present different desires, opinions, and relations on issues, creates a challenge for producing appealing and accepted artifacts. User-centered design targets the challenge by modelling the perception of user's, gathering information about goals, needs, beliefs and thinking with an aim of personalized delivery of desired values (Kramer, Noronha & Vergo 2000: 46–47). Within the design choices the aim for satisfying experience needs to be crafted into the design interaction, with consideration of people's emotional reactions as well as the rational reasoning that emerges from the service or product encounter and interaction. With changing demands and increasing competition, the design aspect must also find a functioning balance between the factors it has the opportunity to influence, which leads to the aim of finding a suitable compromise among the design choices. Thus, the aim of design can vary between the goals of ensuring satisfaction, preventing dissatisfaction, or the greater achievements of excellence and delight (Johnston 2004: 129–130).

For the user-centered approach, it is relevant to discover the operating logic, aesthetics, or functionality that users value. The provided creation delivers an experience that is hoped to engender satisfaction and the design choices influence those feelings. Before any creation, the user's pre-existing assumptions and expectations need to be revealed and investigated. Making the existing assumptions and hopes

explicit enables manufacturers/providers to find a mutual ground for development between themselves and the user (Dray 2014: 82–84). 'Need' also introduces itself as a multi-purpose term, as it can refer to the usability and functionality of a certain artifact or to human satisfaction on a more fundamental level. The user-centered design approach seeks to fulfill these needs by providing design approaches that fulfill the targeted needs whether they are found at an individual or societal level (Keinonen 2010: 17–18).

The provided artifact or service is subject to user experience, and it is up to the design choices to determine how the offered supply will be welcomed. Before anything is created, users' pre-existing assumptions need to be investigated to learn the knowledge base on which they base their expectations. Making these existing assumptions explicit enables the provider and the user to find a mutual ground for development (Dray 2014: 82–84). In the development of effective technologies and systems, user-centered design is set to overcome apparent technological obstacles and has as its goal the satisfaction of human needs (Ritter, Baxter & Churchill 2014: 33–34). Design specifications are meant to find and itemize the functions and appearances that serve people's particular needs and desires, and they are crafted by understanding needs, capabilities, and behavior (Norman 2013: 8–9).

Design thinking represents a cognitive activity that attempts to bring together useful knowledge from different sources, from arts to sciences, so that that knowledge to serve the emerging needs of the moment in context-specific fashion. Therefore, as Buchanan (1992: 6) puts it,

> *"Designers are exploring concrete integrations of knowledge that will combine theory with practice for new productive purposes"*.

Design appears in multiple ways, because the term not only refers to the form of an artifact but also relates to an activity. These multiple meanings produce a challenge for the term, yet also makes it compelling, as design translates simultaneously to the shape of an object, to the outcome of an activity and to the activity itself. Designing gives a shape and an appearance to an idea, whether it is an object or a service. Because the act of designing is about producing something, it's crucial to know and understand the needs and requirements for the outcome as well as the aims of the process (Ulrich 2011: 394–395). Room for confusion remains, however, as design represents different views for different professionals. A designer might approach a design task from its aesthetic value and implement their artistic views for its execution. An engineer might more often be concerned with functionality as well as the constraints and operating fluency of the system. The field of marketing adopts the business requirement perspective to seek an appropriate fit

with customer interests and needs (Townsend, Montoya & Calantone 2011: 374–375). Buchanan (1992: 5) stresses that the concept of design branches into different disciplines and takes on a slight variation of meanings, as it can be detected from the fields of various arts to the natural and social sciences. Yet the concept remains without a single clear definition. Kelley finds a similar challenge facing their methodological concept of "design thinking," in which both terms contain some variance, and their approach doesn't quite fit into any specific methodological structure (Camacho 2016: 88–89).

Design aims to produce creations that solve problems. Among technology, software developers craft solutions to execute tasks so that they serve the purpose users want them to perform and in the way the users desire the solutions to operate. The act of designing has certain characteristics that are expected to lead to a successful design. These characteristics revolve around the functionality, effectiveness and safety of the design, as well as its usability. The design necessities can be viewed as requirements of the surrounding to which the solution needs to adapt, as well as use and functionality requirements that are suitable for the environment where the design is intended to perform. The design suitability approach incorporates most of the required perspectives, as the design solution needs to meet the external expectations, appear safe and secure for its users, and maintain effective and proper functionality despite possible misuse (Denning 2013: 30).

Denning (2013: 31) emphasizes the impact of David Kelley, the founder of the IDEO company, on the field of design, as the company introduced the design thinking approach to a wider audience. Kelley refers to design thinking, in a conversation with Maria Camacho (2016: 88), as

> *"a method for how to come up with ideas. These are not just ideas, but breakthrough ideas that are new to the world, especially with respect to complex projects, complex problems."*

Kelley's design thinking approach to tackle complex problems uses multidisciplinary teams with the support of users testing and analyzing the foundational ideas as they are concretized, in a way that enables the full perception of their qualities. Kelley admits that there is some confusion around the use of the term and how it should be defined, but he sees it primarily as a method of approaching problems, with the full involvement of stakeholders and multidisciplinary experts (Camacho 2016: 88–90). Tim Brown, the president and CEO of the IDEO company, provides an insight into design thinking, as he describes (2008: 86) how design thinking encompasses the human-centered design ethos in finding the opportunities for creative innovations through a full understanding of users, which is gained by direct observation of people. Related to the demands of collaborative work in design,

Buchanan (1992: 14–16) reminds us of the challenges as the design team confront multiple problems from multiple perspectives. The design issues extend to diverse areas and professions, where the individual authority of the experts solving problems also raises the challenge of mutual agreement in collaborative work.

For the creative process, Brown (2008: 88–91) stresses how the successful product, service, process, or interaction is not about the singular creation, but the sum of the multiple and interrelated factors related to it, along with suitable timing. This requirement for a systemic view in the design process thus extends from the matter being resolved to the people resolving it. The example of Thomas Edison, the inventor of the electric light bulb, reflects the required systemic thinking within the process of design thinking, as Brown (2008: 85–86) puts it. Edison's success depended on understanding the need to take a systemic view of his creation and invest in a broader infrastructure, as the light bulb required a functional electricity network in order to work and be usable.

Brown (2008: 86–87) draws a profile of design thinkers that highlights the characteristics and abilities of empathy, integrative thinking, optimism, experimentalism, and collaboration. These contribute to the design thinking process by providing those desired outcomes that consider the context holistically and pursue the delivery of outcomes that serve users' preferences and fit the solution into the overall surroundings.

- Empathy refers to the ability to perceive issues from multiple perspectives, by understanding those who have and should have a part in the development process. Empathy enables the ability of designers to create and imagine solutions that function for others.

- Integrative thinking considers realities from multiple sources, as not all the information needed is found in an analytical way: it also requires the consideration of personalities and social factors. Those implicit and intangible forms of knowledge, although meaningful, have not always been valued.

- Optimism acts as a driving force that pushes a creative person toward a solution, even in a situation that appears challenging at first.

- Experimentalism is curiosity that pushes people to explore and try new approaches and combinations, which in the design process rewards those who try with novel ideas.

- Collaboration and the ability to participate in it is a necessity for creation, as matters now possess such a variety of perspectives that the entirety of

the relevant information forms such a complex array of knowledge that handling it requires multiple experts to work together.

(Brown 2008: 87).

User-centered design focuses on understanding people, considering all their desires, needs and capabilities. The thinking process ensures that the product or service aims are matched with the users' apprehension of the underlying factors related to the design solution. Finding, designing and creating something that is not only understandable and usable but that fulfills the desired tasks and functions and provides joy and satisfaction as an outcome for the user is a massive task. User-centered design thinking requires a thoughtful focus first on the existing main challenges and problems and then on creating appropriate solutions (Norman 2013: 218–219).

Within design, the development process provides differing views that can easily set a multitude of goals that need to be brought together within the process. A development process includes actors from many disciplines in cross-disciplinary fashion, each bringing their unique perspectives to the developmental work. Although the heterogeneity of actors is necessary for the holistic view of development bringing a broad range of expertise, it also comes with challenges. The lack of common understanding between actors, differing methods of working as well as potentially differing values easily causes misunderstanding between parties and introduces different approaches to design. From a product design perspective, the differences in design values can arise from (for example) the views of designers, engineers, and marketers (Townsend, Montoya & Calantone 2011: 374–375). The focus in user-centered design lies in the thinking and values of a specified target group, so the developmental work and user approach investigates these qualities. The needs, desires and wishes of a customer base lie in multiple details that are in the target of detection, for avoiding any type of dysfunction and enabling the ease of use of an object or service. The user-centered development searches for the most functional solutions that respect the fit and finish of users' opinions (Dray 2014: 82–83).

2.6.4   The wicked nature of design

As can be understood from the service design introduction, development does not come without challenges. One is that the service delivery processes are filled with service encounters between process-related parties requiring common understandings about the field of interaction for successful output. The inevitable diversity in understanding and evaluation creates a challenge for the service

interactions, where the aim is to find a nexus for service deliveries that meet or even exceed expectations (Cook, Bowen, Chase, Dasu, Stewart & Tansik 2002: 163). However, despite physiological similarities between people's brains, thinking is still individually affected by one's social and cultural environments. Different experiences of the environment guide the direction of individual thoughts and opinions that direct our thinking and provide our aims for future progress. Thoughtful interaction about the features of the surroundings facilitates individuals' developmental aims, as the evolutionary perspective on human survival successfully points out (Zhou, He, Yang, Lao & Baumeister 2012: 460–461).

The participation of multiple actors creates a conflict-threatened setting for design, which Buchanan (1992) refers to as a wicked problem, according to the definition developed by Rittel and Webber (1973). Forming an awareness of the different values and dilemmas requires an active use of a diverse set of cognitive qualities. Individual differences in cognitive processes regulate thoughts and actions such as self-control, concentration, and thoughtful evaluation, which in turn creates a strong diversity between individuals' understandings of and abilities in knowledge creation (Friedman & Miyake 2017: 186; Diamond 2013: 135–136).

Although Buchanan (1992) relates the wicked problem to service design, this approach appears rather narrow in the field of design, as Suoheimo, Vasques and Rytilahti (2021) demonstrate in their literature review of the relation between service design and wicked problems. The researchers thus recognize an existing research gap concerning the connection between the concepts. The approach of design thinking has, however, been applied to tackling wicked problems, as Earle and Leyva-de la Hiz (2021), and Sheena et al. (2018) show. The researchers present the appearance of ill-formulated, confusing, and conflicting issues as the aim of design activity. Suoheimo et al. (2021: 246–247) go on to explain how the co-creation and participatory design methods, thanks to their holistic view, bring clarity and understanding to the service design field where novel ideas are needed for handling the wicked problems.

Rittel and Webber (see. Rittel & Webber 1973; figure 6) defined wicked problems through ten indications, which ultimately demonstrates the lack of definitive determination of the problem. The design approach requires a defining of the problem to achieve its solution, in sequences that determine all the elements of the problem and the specifications that the design solution ought to meet. The problem solution phase enacts a production plan that takes into consideration the various requirements, and balances them with each other for a balanced outcome. The atmosphere of designing, which represents this described wickedness, illustrates a development where the conflicting issues and values are present in a

multiprofessional development setting that contains a confusion of information as well as ill-determination of consequences (Buchanan 1992: 14–16).

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1. There is no definitive formulation of a wicked problem. Different approaches to the problem see it differently. Different proposed solutions reflect the fact that it is defined differently.

2. There is a 'no stopping rule.' Unlike in an experiment where you can stop natural processes and control variables, you cannot step outside a wicked problem or stop it to contemplate an approach to answering it. Things keep changing as policy-makers are trying to formulate their answers.

3. Solutions are not true or false, rather they are good or bad. There is no right answer, and no one is in the position to say what is a right answer. The many stakeholders focus on whether proposed solutions are ones they like from their point of view.

4. There is no test of whether a solution will work or has worked. After a solution is tried, the complex and unpredictable ramifications of the intervention will change the context in such a way that the problem is now different.

5. Every solution is a 'one-shot operation.' There can be no gradual learning by trial and error, because each intervention changes the problem in an irreversible way.

6. There is no comprehensive list of possible solutions.

7. Each wicked problem is unique, so that it is hard to learn from previous problems because they were different in significant ways.

8. A wicked problem is itself a symptom of other problems. Incremental solutions run the risk of not really addressing the underlying problem.

9. There is a choice about how to see the problem, but how we see the problem determines which type of solution we will try and apply.

10. Wicked societal problems have effects on real people, so one cannot conduct experiments to see what works without having tangible effects on people's lives.

Figure 6.   The ten original characteristics of wicked problems (Rittel & Webber 1973; Raisio, Puustinen & Vartiainen 2019: 5)

The way design extends into and connects different areas can be understood through the characteristics of wicked problems, as Buchanan (1992: 14–18) describes. The nature of design contains the essence of wicked problems, and developments should therefore be approached by considering the existence of such challenges as presented by Rittel and Webber in 1973 (Figure 6). The presence of the wicked problems emphasizes how design processes need to be approached with holistic considerations in mind. As Raisio (2009: 486–489) and Raisio, Puustinen & Vartiainen (2019: 6–8) describe, the collaborative approach used to tackle

wicked problems provides a functional approach to manage these multifaceted challenges that the design process also confronts (Buchanan 1992).

Design thinking is also changing. With simple artifacts, design is able to follow simple, straightforward fashion. The idea of functionality is easy to grasp for a creation that is meant to process an obvious task, and the person operating the tool improves the artifact's design as they make discoveries while using it (Maceli & Atwood 2011: 98). According to the wicked problem terminology, some of the design choices can be described in terms of a "tame problem," as Raisio, Puustinen & Vartiainen (2019: 4–6) define them:

> "The concept of tame problems offers a form of counterpart to the concept of wicked problems. Tame problems can be defined thoroughly and permanently. There is little or no ambiguity. It is relatively easy to reach a common understanding of such problems, so conflict situations are rare. In addition, it is obvious when a tame problem has been solved; there is a clear end solution, and its accuracy can be evaluated objectively."

Raisio (2009: 480–481) explains that unlike simple challenges, the presence of wickedness becomes apparent as the number of engaged actors increases and the fragmentation of the issue becomes pronounced. This all increases the challenge of understanding the extent of the problem and the influence of the possible solutions. For sustainable outcomes it is vital to recognize the nature of the issue. Taming a wicked problem as defined by Rittel and Webber (1973), and which Raisio, Puustinen and Vartiainen (2018: 5) characterize as being so "multidimensional, interrelated and ambiguous that understanding them is a considerable challenge", can lead to major issues with conflicting values and interests that create unwanted uncertainty over the functionality and quality of the outcome (Rasio & Vartiainen 2015: 344–345).

Considering the appearance and added functionalities of the digital artifacts, the computer industry displays a shift from simplicity to complexity. This is not to say that the use of a computer would not previously have required mastering a specific technical skillset, but rather that the whole industry has now become intertwined among different users, developers, and providers. Where previously technological solutions served a certain specific purpose for a specific professional, artifacts now are required to function at home as well as at the office, connect to other peripherals, serve multiple functionalities, and function well for the expert as well as for the average consumer (Maceli & Atwood 2011: 98–99). The increased functionalities and constant development affect people, as progress can become an obstacle for some. The requirements for technical skills and knowledge, together with

emotional influences, can build barriers against the use of an artifact, and development turns against itself by *reducing* usability and utility (Chammas, Quaresma & Mont'Alvão 2015: 5397–5399). Development seeks to answer demand; yet as progress advances it gives birth to new demands, such as the complication of digital devices resulting in the demand for modification. In this way, the balance in design has also shifted to favor the user, giving them control over usability (Maceli & Atwood 2011: 98).

Good design for the creation of digital services and solutions considers the previously mentioned perspectives (Norman 2013: 4), as successful production involves multiple perspectives taking advantage of different views (Fallman 2003: 225). A design can be seen as a way of creating something that previously did not exist, thereby giving a shape and form to an abstract idea that is reified during the design process. Design takes the artistry of imagined or irrational creations and makes them real. On the other hand, design functions to take advantage of existing opportunities to create a functional solution that honors pragmatic realities. All the aspects of the nature of design become apparent in the creation of artifacts and solutions that deal with the borders of human-computer interface (Fallman 2003: 225–227, 231–232). While requiring social and technical aspects to be considered in development, the design of digital services and solutions highlights the importance of human needs in the integration of novel technological solutions. The socio-technical approach optimizes the outcome aims by utilizing the unique skills and abilities of humans along with novel technological achievements (Mumford E. 206: 319–321).

3   FORMING AN UNDERSTANDING THROUGH AFFORDANCES

Even though digital technology already operates certain activities independently, its achievements are still managed by people as the digital surroundings function as the medium of the functionalities. The digital artifacts and solutions provide life-enhancing and work-relieving options for users, thereby serving people in their needs, desires and requirements. The utilization of digital advances are very personally related to people's abilities and to the context of their environments, thus appearing subjective to people's individual requirements and perceptions (Chammas et al. 2015). The theory of affordances provides an insight into the actor-environment relationship behind the opportunities and features of digital technology (Anderson & Robey 2017; Leonardi 2011; Conole & Dyke 2004; Bæretsen & Trettvik 2002).

By inspecting the size, shape, texture and build of an object it comes possible to determine ways to utilize its qualities for any suitable purpose. Setting aside the intended and obvious use, the qualities of an object can also open totally new and creative ways to utilize the object's characteristics. It is toward these attributes that affordance theory guides us (see Leonardi 211: 152–154). The theoretical approach of affordances used in the research comes from the field of psychology where it was originally introduced by J. Gibson in 1977, offering at its time a controversial approach to depicting the world through direct perception. Based on their faculty of vision, people perceive their surroundings differently; those differences may be substantial or marginal. In Gibson's theory, the perceived knowledge of the environment is gathered by the information captured in our vision as the surrounding is observed (Gibson 1977). It is on this formation of perception that this research bases its grounds for utilizing the opportunities of the digital medium.

The theory of affordances provides the means for viewing the opportunities and features of the ongoing digital transformation. As Gibson (2015: 229) shows, the affordances point in two directions, to the observer and to the environment. But in the context of perceiving the characteristics of the digital medium, digitalization is viewed both as the platform of affordances as well as their intermediary. This thesis suggests viewing the digital opportunities in light of their qualities for providing functions, as well as for mediating the desired functions for the surroundings.

The Gibsonian (2015: 211) view of affordances as the relationship between an animal and its environment reflects the creation of a meaning based on the properties of the environment and the perception of the observer. Therefore, it is subjective

perception that comes to define the affordances of the environment, for good or ill. As Gibson put it:

> *"The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill".*

The digital medium often provokes controversy over interpretations of its nature, due to the subjectivity of describing how it manifests to people (see Bolton et al. 2018; Norman 2013; Maceli & Atwood 2011; Rodden 2008). It is these perceptions that the affordance perspective helps to interpret, whether the attitudes are for or against, unbiased or prejudiced.

The functional execution and usability of digital artifacts and solutions can be achieved by forming a holistic understanding of the digitally enabled actions, especially when including the user perspective, with its intentions and skills, in the consideration. The affordances of digital technology represent the various potential use-cases of an object that are perceived by an individual. This quality makes the affordance approach useful for identifying the user-perceived purpose of specific technology and thus provides a meaning for their design (Volkoff & Strong 2013: 821–822). The concept guides the provision of an explanation from the subjective point of view of how the object and its purpose, along with its functionalities, are perceived. Volkoff and Strong (2013: 822–823) add that because an object can provide multiple affordances, it is also worth considering the affordances for a larger community.

While Gibson's (1977) presentation of the theory of affordances is frequently described as vision-based approach, the nature of the digital medium often means that its content is presented as something nontangible. This feature makes visual and sensory observation almost impossible, so this research will utilize the affordance approach more in the figurative sense. The interpretations of the affordance perspective are viewed as guidelines that define peoples' cognitive processes. This study goes on to interpret peoples' perception of the digital medium to clarify the formation of the digital affordances.

The chapter explains how to view the dimensions of digital technology holistically. The theory of affordances provides the cognitive tools to build that holistic understanding and form a perception on why things are "seen" as they are. Due to its phenomenological nature, the affordance perspective builds awareness about how people subjectively perceive their environment and its objects. The qualities of the affordance perspective affect both the digital medium and act of co-creation, as shown in Figure 7.
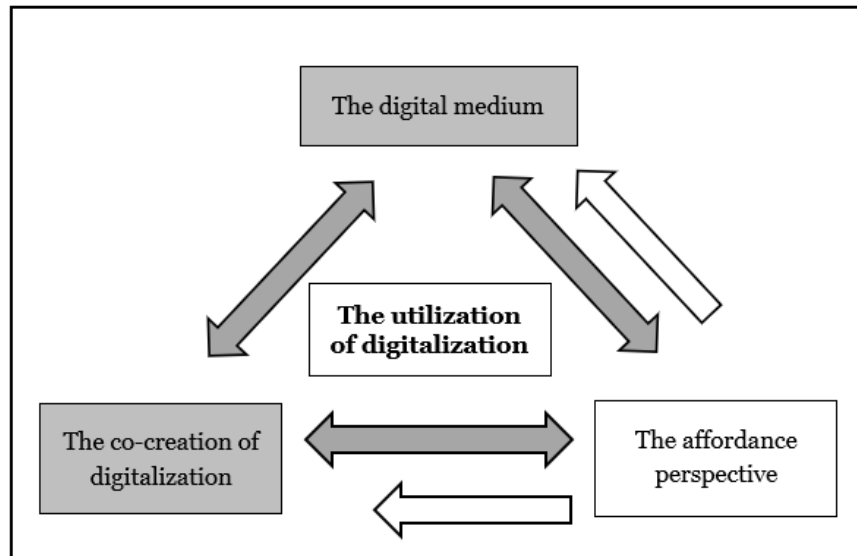
Figure 7. The impact of the affordance perspective

The affordance perspective looks at the environment in which the digitalization appears, as well as to the artifacts and solutions of the digital medium itself. But just as importantly, the affordances depend on the ways, capabilities, and resources of the people, in terms of how they can and will view the medium.

3.1 An insight into the affordance perspective

The technological transformation of information and communication technologies has brought demands as well as possibilities. Its effects become visible wherever new methods are adopted for use, whether in an organizational environment or by individuals (Petrakaki, Klecun & Cornford 2016: 207–208). Zammuto et al. (2007), for example, clarify how technology has been closely related with the founding of organizational form and the functioning of its systems for decades, as the operations pursue effective production of outcomes and informed decision making. Petrakaki et al. (2016) stress how the adoption of technology requires a broad insight into the promises, requirements, and effects that technological integration introduces. This perspective involves a comprehensive view that includes cultural and institutional influences, over and above the material- or function-related perception of technology.

While observing the world around us, the embeddedness of the digital technology and the pervasive integration of its functions quickly become apparent. How digital technology has captivated the arenas in which people are working, trading, socializing, and existing is obvious, as Yoo, Boland, Lyytinen and Majchrzak (2012:

1398–1400) point out. Hutchby (2001: 441–442) successfully explained how the nature of technology incorporates not only the technology itself but also the complex relationship between the social and interactional circumstances in which it exists. Through these relationships, the technologies attain their meaning. Hutchby's characterization of affordances perfectly aligns with Gibson's (2015: 229) description:

> *"An affordance points two ways, to the environment and to the observer. So does the information to specify an affordance."*

Due to this reciprocal relationship, affordances gain unique meanings for each person. Moreover, the overall appearance and functionality of the affordances needs to be understood in the context of the existing relationship. Gibson (2015: 233) calls the affordances "properties that are taken with reference to the observer".

Gibson (1977) introduced a theory of affordances that emphasized the importance of recognizing and understanding the aspects of environment, information and perspectives of perception in order to comprehend the appearance of the affordances. In his publications, Gibson referred to the observer of the affordances as an animal: other terms such as actor, user, person, individual, agent and human have also been recognized as synonyms of 'observer' (and each other) (Pozzi et al. 2014: 2).

The concept of affordances approaches an object's functionalities from a psychological standpoint and offers a causal explanation for actions in terms of 'how' and 'why'. In short, affordances represent the diverse uses of an object perceived by an individual. By understanding people and their perception of the technological sphere around them, the concept can provide explanations of the meanings and understanding associated with the use of technological artifacts (Volkoff & Strong 2013: 821–822). The nature of technology and peoples' diverse social and cognitive views on its utilization have recently become widely recognized among researchers in technology-related fields. This has resulted in a favored perspective from which to view the concept of digitalization via the relationship between the technology and the person: an affordance perspective on digitalization (see Pozzi, Pigni, Vitari 2014; Petrakaki et al. 2016; Zammuto et al. 2007; Hutchby 2001; Hurtta & Elie-Dit-Cosaque 2017; Wang H., Wang, J., Tang 2018; Anderson & Robey 2017).

As the relationship between the person's abilities and the qualities of the environment specify the opportunities for affordances, the interpretation of the affordances can begin with questions such as

- What do we actually "see" in our surroundings?

- How do we perceive our environment?

- Why do things seem as they do?

These questions point to the environment, to the person and to the ways in which the events appear in front of us (Gibson 2015: 212). The approach draws attention, within the context of digitalization, to the digital medium itself; to the capabilities, resources, skills, and interests of a person; and to diverse elements and their shape, size, and form within the environment.

Certain physical objects clearly indicate their intended use or other usable qualities. This transparency makes their perceivable affordances easily discoverable, which helps users have a positive experience of the usability and operation of a product. But even though affordances exist independently of the observer, the external elements such as culture, social setting, previous experiences, and internal intentions affect the perceptual information of the affordances. The influencing forces affect the representation of objects or targeted services and operations; for example, certain culturally sensitive issues need to be honored in the presentation of supplied artifacts and services (Gaver 1991: 2–3).

Volkoff & Strong (2013: 821–822) define affordances as reflecting the opportunities presented by an artifact and thus providing answers to how and why certain objects could be utilized. But rather than in an object's properties, the affordances emerge in the relationship between an object and a person. Thus, the skills, abilities, understanding, and awareness of a person comes to determine the overall functionalities. Ultimately, the observation appears unique to each person. This observation by Norman (2013: 11–12) stresses the reciprocal nature of the affordances and reminds us of how the functionalities of a product need to be seen from the relationship perspective. From Gibson's (1977, 1979) introduction of it in the field of ecological psychology, the theory of affordances spread to various disciplines. In relation to the field of technology, the concept gained popularity in the Information Systems (IS) discipline, particularly when Human Computer Interaction (HCI) adopted the concept after the appearance of Norman's 1988 publication The Design of Everyday Things (Brygstad, Munkvold & Volkoff 2016: 86–87).

As noted, from Gibson's original introduction of affordance theory Norman (1988) carried the concept into the field of design. Norman's focus was on drawing necessary attention to the design of things, emphasizing the usability and functionality perspectives on the objects (Bærentsen & Trettvik 2002: 51–52). The affordance perspective provides the opportunity to explain the dynamics of the relationship between an observer and an object. Material objects suggest a set of specific uses according to their appearance and features. The built qualities favor shapes and

invite specific uses while they might also constrain and limit certain uses. The theory of affordances gives direction to understanding the features determining a function, as the possibilities for action are not self-evident but depend on the intention of an actor engaging them (Zammuto et al. 2007: 752).

Due to the growing complexity of technical artifacts and people's various intentions, certain technological objects can be associated with multiple affordances. An actor's intention as well as their competence and knowledge affect the actualization of an affordance. Thus, the actualization can be viewed as resulting from the combination of needs and capabilities. The differences in the socio-technical aspects of understanding and motivation promote an actualization of different affordance mechanisms. The differences in view result in various levels of affordance from the same object, as they have been observed differently (Bygstad, Munkvold & Volkoff 2016: 87-88). Bygstad et al. (2016: 88) provide an amusing but illuminating example to illustrate the emergence of different affordance mechanisms:

> *"A woman is standing in a street at night, and throwing small stones at a window on the second floor, apparently trying to wake somebody up. A passer-by observes the scene, and approaches the woman with the words 'Hello, I can help you contact whoever is up there. Please use this mobile phone'. The woman looks at him, takes the mobile phone – and hurls it towards the window!"*

As the affordances represent the various uses of an object perceived by an individual, the concept gives an explanation for the variety of meanings and understanding associated with the use of technical artifacts (Volkoff & Strong 2013: 821–822).

3.2   Affordances' by James Jerome Gibson

The ecological psychologist J. J. Gibson (1977, 1979) introduced the affordance approach for discovering the relationship between an actor and its environment. The theory of affordances represents the opportunities that the environment offers a person. In Gibson's view, the opportunities of the environment are exploitable according to how the environment is perceived by the individual. In its original manifestation, Gibson (1977) presented affordance theory as explaining the relationship between an animal and its environment, where the actualization of affordance occurs through the direct perception of the features and appearance rising from the environment. The actualization of the affordances depends greatly on the qualities and capabilities of the observer, but even more so on the permissive or restrictive characteristics of the environment. The affordances emerge from the interconnection of the signals of the environment and the insight of the observer. As

material objects suggest a set of specific uses according to their characteristics, their built qualities shape, favor and invite the uses to which they are to be put while also constraining and limiting certain other potential uses. The theory of affordance offers a way to understand the perception behind a function, as possibilities for action are not self-evident but depend on the intention and view of the engaging actor (Zammuto, Griffith, Majchrzak, Dougherty & Faraj 2007: 752).

For the observation of the environment, Gibson relies on visual perception of the nature of the different levels and textures of the observer's surroundings. Visual perception plays a prominent role in Gibson's theory for discovering existing affordances, and direct perception acts as the means by which existing true knowledge may be captured (1977, 1979, 2015). Based on perception, affordances represent a subjective view of the possibilities of the environment, while their realization depends on the observer's insight, locomotion, and location (Gibson 1979: 1–4, 128). In Gibson's (1979: 137–140) terms, the affordances represent offerings from the environment: a knife affords cutting, fire affords warmth and speech affords interaction. These examples present the use of objects, but objects can provide multiple offerings depending on individuals' needs and insights: a glass can also be used for cutting, fire can give light and protection, and an interaction can also occur through writing.

Building on Gibson's (1979: 137–140) work, it becomes apparent that an environment and its artifacts have a diverse set of qualities that can provide affordances for multiple functions. To achieve the desired results, only the individual capabilities need to mesh with the offerings provided by the environment. The affordances come to provide an explanation for understanding people and the outcomes of their perceptual discoveries within the environment. The user-discovered affordances also reflect the symbiotic relationship between an individual and the artificial environment. The discoveries concerning human-computer interaction contain an understanding of the highly complex functionalities of information and communication technology in a subjective and context-related social setting (Zammuto et al. 2007: 752–753).

Affordances depend on objects' qualities but rely even more on the permissive or restrictive characteristics of the environment. Material objects suggest a set of specific uses according to their qualities. Constructed qualities shape, favor and invite certain uses while constraining and limiting others. Affordance theory points to an understanding of the characteristics underlying a function, as possibilities for action are not self-evident but depend on the intention of an actor engaging them (Zammuto, Griffith, Majchrzak, Dougherty & Faraj 2007: 752). The environment becomes apparent to the observer through the elements of the medium, its

substances and its surfaces, whose qualities are grasped in increasing detail. When considering utilizing certain objects, a thorough inspection of their features reveals their defining characteristics, such as the tensity of their material, their textures, their strengths, etc. All these influence the usability and thus the affordances of an object (Gibson 2015: 41–94).

Gibson's decades of work culminated in 1979 in his last book, *The Ecological Approach to Visual Perception*, with the introduction of the theory of affordances. Gibson's view introduces direct visual perception as the method for understanding and interpreting the affordances arising from the interaction between an organism and an environment (Good 2007: 269). The ecological psychology movement is irretrievably associated with the psychologist James J. Gibson (1904-1979) thanks to his pioneering work on the perceptual process that resulted in the concept of affordances. Gibson and his wife, Eleanor J. (1910-2002), dedicated their careers to developing the ecological approach to perception in relation to organisms and their environment (Withagen & van Wermeskerken 2010: 489–490; Lobo, Heras-Escribano & Travieso 2018: 1–2). Later, E. J. Gibson continued fusing developmental psychology with the ecological approach to perception (Miller 2016: 378–379). From the mid-20th century, Gibson challenged the dominant view in psychology of the world being a product of the mind as one experiences it. Instead, Gibson emphasized the meaning of one's environment, which until then had been neglected among philosophers and psychologists (Withagen & van Wermersken 2010: 489–490).

J. J. Gibson focused on the development of visual perception throughout his career, continuously developing his thoughts by revising and extending his previous publications, and culminating in *The Ecological Approach to Visual Perception* (1979/2015) as described above. Gibson published three books in his lifetime: *The Perception of the Visual World* (1950), *The Senses Considered as Perceptual Systems* (1966) and *The Ecological Approach to Visual Perception* (1979), which was published shortly before he died of pancreatic cancer in 1979 (Mace 2015: 21–23). However, Gibson's theory of affordances first appeared in a publication by Shaw and Bransford (1977) entitled *Perceiving, Acting and Knowing: Toward an Ecological Psychology*. Shaw's and Bransford's (1977) publication arose from a 1973 conference at which Gibson presented his notion of affordances (Mace 2015: 23; Shaw & Bransford 1977: viii). The final version of affordance theory appeared in *The Ecological Approach to Visual Perception*, after he and his colleagues made multiple revisions to the earlier-presented chapter (Mace 2015: 23).

3.3 Viewing the perception of affordances

Before exploring the different dimensions of affordance actualization it is worth describing a way to view and detect the affordances. In ecological psychology, the environment around us and in which we live is perceived through the organism's capabilities, not in terms of its physical metrics. While objects physically appear in the environment it is only through individual perception that they gain their meaning. This dualism between the ecological and physical environments captures the essence of how possibilities for action are perceived and drawn from the environment. The ecological approach exposes the essential reciprocity between an actor and their environment, as the surrounding-specific information is extracted from the ambient visuals in an active perception process (Lobo et al. 2018: 5–6). The characteristics of the theory of affordance are such that it provides an approach to consider the affordances of the surroundings, by determining how those surroundings can be observed and the defining features of the person making the discoveries.

The following chapter explains the affordance theory perspective through the characteristics of dualism, visual information, and locomotion, which it introduces as the key elements for understanding the emergence of affordances. The introduced concepts reveal a set of other related characteristics that all intertwine in the process of perceiving affordances. Dualism emphasizes the nature of the environment and how the affordances need to be detected, whereas the rules of visual perception and locomotion connect with their characterizing qualities for detecting opportunities. Understanding visible perception provides insights on how information transmits that we can perceive it, and locomotion enables a broader sense of the surroundings. The latter part of the chapter concentrates on the features that make affordances detectable and attractive for observation, as well as identifying how affordances can be designed to match popular perception.

3.3.1 Dualism

It is indisputable that visual systems gather information about the environment by producing a perception of their surroundings. Through the operations of the human anatomical and neurological systems, an image is produced by sensory stimulation with the alteration of millions of receptors each connected to the neural network of the brain, a combination that ultimately forms the complicated physiological system of vision. The visual system detects a flux of stimulation as the lens of an eye paints an image on the retinal canvas and transfers the information through a network of nerves to the brain, which acts as the central processing unit. However, Gibson's notion of direct perception insists that the information lies in

the environment, rather than in the previously explained process of the brain processing the information (Neisser 1989: 2). In Gibson's view, the perspective of direct perception rejects the idea of a brain creating the perception of reality, where perception is based on correcting and compensating the information coming from retinal stimulation. This unmodified perception allows the observer to view their surroundings without mental restrictions and reminds them of their freedom to discover functionalities based purely on the shape, size, and texture of the object. Direct perception derives from the theory of information pick-up, where the observation is detected through the ambient optics, without the interference of the visual sensations being processed by the brain (Gibson 1972: 77–78)

Good (2007: 269–270) goes on to explain that central to the ecological psychologist approach to perception is the idea that the world can be directly perceived through the information it provides. As mentioned, the perception is formed without the requirement for mental representations to understand the content. As a result, the ecological approach to perception emphasizes the connection between knowledge and action. The existing understanding is utilized to form a functional solution from the discovered characteristics of the object. As explained in the introduction (see Chapter 1), Gibson (2015: 118) emphasizes that the opportunities already exist in the environment, but the observer's qualities determine whether they detect them.

The definition of affordances describes the subjective and unique nature of the relationship between a person and his surroundings. In this relationship, the interaction between the environment and the observer forms a dualistic organism-environment system, in which the information for affordances does not locate in a single point but in the array of ambient information that is gathered by the interpretation of the observer (Lobo et al. 2018: 5–6). Järvilehto (1998: 329–330) verifies (from a theoretical standpoint) that in an organism-environment system, a person and their environment need to be considered interrelated in the process of constructing knowledge, since the elements contain a strongly influential connection between each other. This idea emphasizes the requirement for a systemic approach to perception, instead of an isolated view of its parts. The dualistic view notes the differences in observations due to people's divergent values, interests, motivation, and priorities. To gain a comprehensive view, a person needs not only to understand *their* approach to the matter but also to grasp the interests and values of the other people creating interpretations about the common environment.

This dualistic relationship forms the core understanding of the affordances discovered. Dualism includes the interests, values, motivation, and goals for functions, as well as the creative vision of an object's features that leads insight toward a

certain view. Regarding the formation of perception, the affordance theory explains how full vision is aided by continuous and mobile observation (Gibson 2015: 237–238). As with Gibson's (2015) and Stoffregen's (2003) presentation of affordances, the explanation reminds us of the multidimensionality of the act of perceiving. The dualistic nature emphasizes the requirement for a holistic perception of the surroundings given the diversity of views among people. Costall (1995) added a social factor to the affordances, with which Gibson's work can be seen agreeing. Even if the perception of affordances appears as the outcome of the relationship between an actor and its environment, the outcomes can also present parallel dimensions of interpretation. The senses can offer a direct perception of the observed scene while externally provided meanings offer social affordances. For example, a picture consists of different substances and textures to be viewed but it also delivers a variety of socially influenced meanings according to its subject (Costall 1995: 469–471).

As the perception of affordances depends on the qualities of the environment and the capabilities of the observer, Stoffregen (2003: 129–131) suggests defining the emerging affordances as properties of an animal-environment system. Stoffregen justifies this holistic systems approach by pointing out that the reality of the actualizing affordances often depends on multiple simultaneously emerging events. As the example of a pedestrian crossing the road demonstrates, the person needs to determine the "crossability" of the road by assessing the street signs, the surface of the road and the time available for the crossing, as well as possible approaching vehicles whose drivers rely on multiple factors to influence their behavior as they near the crossing. As noted, the perception relies on the visual information that is usually sensed holistically using the whole body, which can be enhanced through practice as Yu and Stoffregen (2013: 309-310) discovered when they detected a connection between the emergence of affordances and rehearsal. Labinger, Monson and Franchak (2018: 1-2) also investigated this idea that affordances depend on the actor's abilities and their awareness of those abilities and skills. However, since perception ability also relates to the ability to adapt to changes by adjusting either one's abilities or the surrounding's characteristics, the act of learning can strengthen the skills needed for perception.

3.3.2   The visual information

In the ecological view, visual information is structured as the observer moves through the environment in the presence of ambient light. In this model, the cognitive gains occur in ways that are immediate, truthful, and effortless; products of what Gibson refers to as "direct" perception (Neisser 1989a: 2; Neisser 1989b: 11).

In *The Ecological Approach to Visual Perception* (1979), Gibson introduced the ambient optic array as facilitating the visual approach to direct perception (Gibson 1979; Gibson 2015). Ambient light is a necessary condition for visual perception, as the stimulation of photoreceptors is vital for seeing. The theory of direct perception treats the concept of light differently than physical optics. Direct visual perception distinguishes between stimulation by light and the information in light, where the latter represents the meaning of the ecological term 'optics'. Information in the light can be considered the source of direct perception, which contains the knowledge as an optic-array of information. Optic-array is the term for information in light, outside the observer, where perception is formed with an active exploratory and circular process involving the whole visual system, not only in nerve impulses to the brain (Gibson 1972: 79–80).

Gibson establishes direct perception largely on the basis that people experience the real world through their activities, as most of the relevant information structures become available for perception through action. The idea of direct perception argues against the mental representation of reality, as it doesn't accept any indirect information as being revelatory of the truth. One must be able to observe the surroundings from all angles and every perspective to perceive all the relevant information (Costall 1995: 468–470). From the theory of affordances, Costall (1995: 469–471) shows how Gibson came to accept the idea that perception can be learned by socializing, as people can learn meanings by seeing, for example, something being eaten. This demonstrates the evolution of the idea of direct perception, as in his early studies Gibson argued against the picture theory of perception, stating that pictures are not able to provide the holistic understanding necessary for full perception, and information must be conveyed directly. Direct perception allows seeing as the information about the surrounding is extracted from the light. Gibson refers to the structure of information available to the observer as the ambient optic array. The picture dilemma is still present in Gibson's theory but Gibson moved to acknowledge that pictures make perception possible, despite the limitation of an invariant moment from a single point of observation. 'Picture' gains a dualistic meaning, appearing both as a surface of an aesthetic object and as a display of information, thereby being able to display the results of fiction or creative imagination (Gibson 2015: 403–413).

As introduced, ecological psychology grounds its thinking in direct perception, which illustrates the active process of perception in which organisms gather awareness of the world around them, and the observation of direct perception depends on the distinction of perception. The principles of direct perception suggest that things need to appear distinguishable, as the details need to become visible to the observer. Therefore, perception requires a physical intermediary between the

object and the organism, to which the object must be sensitive. Resulting from the principles of direct perception, the acquired information is structured in the ambient energy of light surrounding the environment (Charles 2011: 133–134). In Gibson's description, the structure of information appears as an ambient optic array, where the surrounding-specific information is then extracted from a point of observation (Gibson 2015: 120–124). Ecological psychology perceives the environment through the active process of observation via continuous detection of the active possibilities or meaningful information of the environment. The ecological environment differs from the physical as the separation of meaningful information relates to the capacities of the organism rather than to outside stimulation. In the ecological sense, as the observer detects specific information for the guidance of behavior, the obtained information does not need cerebral processing or enrichment; the perception lies in the specificity of the picked-up information. Nevertheless, the physical approach guided by neurosciences is also acknowledged as an important aspect for enabling the process of perception (Lobo et al. 2018: 6–7).

The cognitive awareness of the opportunities around people is a compelling and controversial topic due to the different approaches to perception. The physiological approach to perception explains the sense of perception as a product of the human neural system operating the human body and enabling action, as Osiurak, Rossetti & Badets (2017) demonstrate in their article about affordances viewed through the lens of neuroscience. The neuroscientist perspective on affordances explains the insight provided by affordances with physical and neurocognitive means, combining the knowledge and control of the human body with the perception and actualization of affordances. Osiurak, Rossetti and Badets (2017: 406-409) divide the operationalization of an affordance in a three-stage system involving the motor control, mechanical knowledge, and function knowledge of a human. The interplay between the knowledge systems and motor control enables the detection of affordances and their operationalization. Tools demonstrate this interplay, as when a human needs to know about the tool, its functionalities (i.e., how to use it) transfers to action and involves the motor skills to handle the tool. As Gibson said, the actualization of affordances happens in relation to the actor and the environment, as long as the environment's possibilities correspond with the actor's abilities (Osiurak, Rossetti & Badets 2017: 404, 406-409). The neurocognitive approach provides an insight into the system operating the human capabilities, which resonate with the person's ability to detect the affordances according to Gibson's direct perception.

In the ecological perception, the information, awareness and knowledge are constructed from the information in the light, referred as ecological optics, that appears as an ambient optic array to the observer. The ambient optic perceived by

the observer provides the insight of an affordance in the reference of the observer, so the information to specify the affordance points in two directions, to the environment and to the observer, as explained by the dualism characteristic. Gibson (2015: 229–230) justifies ecological perception from the systemic view appearing in the theory of affordances. The information perceived through a visual observation is accompanied by the awareness of oneself being a part of the perceptible world. The notion emphasizes the relation of sensing through the components of one's body, together with the visual perception of one's movement relation to the environment.

> *"The information to specify the utilities of the environment is accompanied by information to specify the observer himself, his body, legs, hands, and mouth. This is only to reemphasize that exteroception is accompanied by proprioception – that to perceive the world is to co-perceive onself."* (Gibson 2015: 229–230).

Even though Gibson determined a person's awareness by the information they detect through direct perception, the range of possibilities depends on the information that the observer possesses. In Gibson's view, the full perception is formed by gathering and combining all the relevant information from the surroundings through direct observation that exploits all the senses to generate understanding. The information pickup is thus formed through direct observation, but with the aid of the whole sensory system of sight, sound, smell, touch, balance, kinesthetics, acceleration, body position, etc., which determines the overall perception of affordances. As a result, the creation of the artifact, service or interaction should provide experiences for all the necessary senses (Norman 2013: 12).

3.3.3   Locomotion

So far, the roles of dualism and observable visual information in understanding the affordance perspective have been explained. Locomotion adds a changing perspective to the discovery of affordances. Taken into, ecological perception helps to better understand the features of perceiving the possible affordances of the environment (Gibson 2015: 211–215). The visual information clarifies how the source of information becomes apparent from a point of observation, in the same way that a camera forms a picture on the light-gathering apparatus. But this view of information remains one dimensional if the observation point does not change. The overall perception thus becomes final once the observer detects the object from multiple angels and this where the feature of locomotion comes to play. The movement of an observer is an important element in the emergence of affordances, as objects present themselves differently from different perspectives and also in

different time frames (Stoffregen 2003: 120–122). The requirement for locomotion can be illustrated from Gibson's (2015: 127–130) description of the illumination of the ambient optic array, as shown in figure 8.
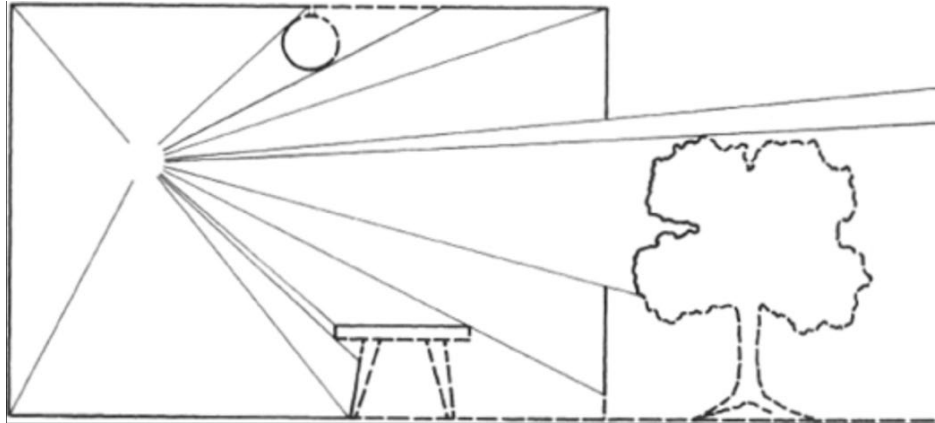
Figure 8. The ambient optic array from a room with a window (Gibson 2015: 128).

As the ambient optic array shines on surfaces, the outline of the objects becomes illuminated and thus provides an opportunity for visual perception. The surfaces and their textures in the shadows, as pictured in the figure with dotted lines, remain hidden and unidentified to an observer. Through the ambient optics, the observer is able to directly perceive all the detailed information in the scene, as the material objects appear with their full set of features, colors, textures and shapes to the observer (Nelson, Jarrahi & Thomson 2017: 55). Without observer movement, many features in the scene remain hidden and do not reveal the true qualities of the objects to the person observing and searching for the opportunities the environment could provide. Gibson's rule of direct perception requires visual appreciation of the object, so that a person's mental processes would not derive any false interpretations of the environment. Building on the previous illustration, figure 9 below (Gibson, 2015: 131–133) illustrates the requirement of locomotion and describes the meaning a changing perspective has for the full view of the scene.
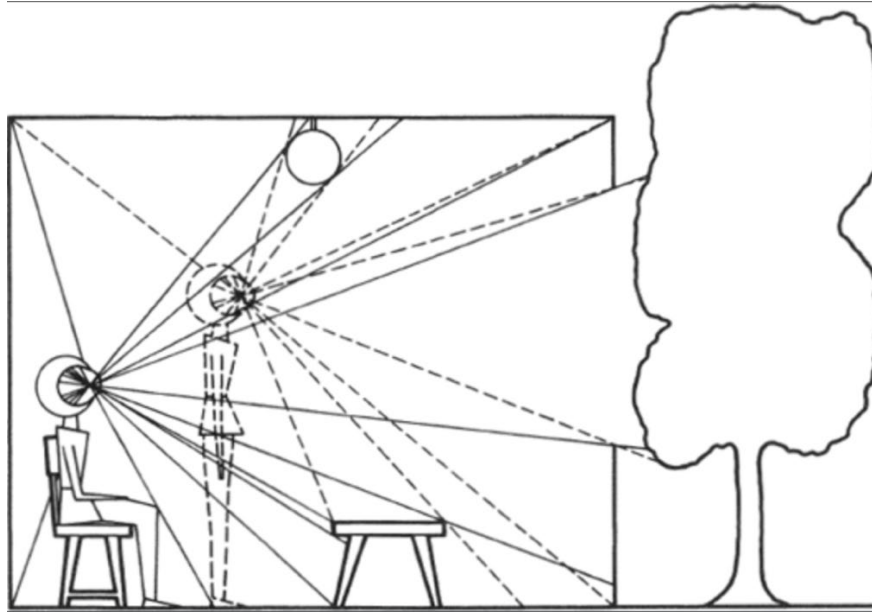
Figure 9.   The change in the optic array brought about by the locomotion of the observer (Gibson 2015: 132).

With movement, the observer's point of observation changes, which reveals new perspectives for the visual perception as the ambient optics reach the observer's sight. In figure 9, the dotted lines represent the angle of view of the standing observer and the solid lines represent the view of the sitting observer. The figure demonstrates the differences in the perceivable view depending on the location of the person. The illustration reveals two things: first, as the point of observation changes, the view provides new insights from the environment, creating a different image of the possibilities in the environment. Second, during constant locomotion, the observer creates a detailed all-round perception of the surrounding environment, revealing more details about its substances and surfaces. A different perspective corresponds directly with the location of the observer. The scene appears different based on the viewing angle of the observer, but metaphorically, the example also reflects the differences in people's perception based on their socio-economic state, occupation, cultural heritage and background, gender, and sexual orientation, as a result of which each person observes the world and its events with the unique view arising from their personal point of observation.

The act of locomotion completes the perception of affordances, as it helps to provide different results from the environment based on the angle of view, both literally and figuratively. Yu and Stoffregen (2012: 309-310) discovered how the control of locomotion provides more accurate insights about the actor's ability to master different tasks. So while locomotion enhances the ability to perceive the affordances, the control of locomotion enhances the accuracy of the perception. This

can be illustrated with the example of a moving car: once a driver is able to control the movement, acceleration, braking, handling etc. of a vehicle, the simultaneous detection of the features of their environment become more feasible and accurate. (In other words, it is easier to read road signs when you don't have to worry about how to change gear, etc.) With their study, Yu and Stoffregen (2012: 309-310) demonstrated how the opportunity to control and practice movement-based activities enhances the accuracy of the actions and also educates the mover about their awareness of the required abilities, knowledge, and skills for utilizing the affordances.

The theoretical perspective on the theory of affordances has thus far provided a necessary understanding of the characteristics essential for the perception of affordances. This general understanding about the principles of affordances and their perception forms the basis for viewing the opportunities and challenges related to the utilization of digitalization. The remainder of this chapter leads towards the conditions required for the successful presentation of digital technology, considering the representation of its functionalities and characteristics in a manner comprehensible to its intended user groups.

3.3.4   The appearance of the surroundings and the objects within

The elements of dualism, visual information, and locomotion act as features supporting the perception of affordances. These elements clarify the requirements and considerations for the person observing the environment and seeking affording opportunities. For content creation, whether service design products or organizational processes and structures, the enabling features need to be assigned to the surroundings in a user-friendly manner. Does the appearance and design of artifacts and solutions enhance the intended affordances so that they become visible to the target audience?

As mentioned earlier, the detection of diverse elements in our surroundings enables the discovery of potential affordances, but due to subjective perceptions the underlying features of those elements provide each observer with a different meaning (Gibson 2015: 209). To begin with, Gibson (2015: 42) reminds us of the differences appearing in the surveilled natural environments: the geological environment with its minerals, for example, creates the ground and its rocks, sand, and gravel; the chemical environment offers water and air, with their perceptibly different appearances. As environments differ, so does their appearance. The perception of the environment also takes on different connotations based on the observers' knowledge and experiences, as well as the aim of their observation. The affordances become apparent when the actor engages with the environment through

their subjective intention to discover opportunities for utilizing the surroundings. From the perspective of an artificial artifact, the design of things becomes more meaningful as the intention crafted to the object becomes apparent to the observer through the qualities that object mediates for perception (Glaveanu 2012: 194).

The values and characteristics that people relate to their environment possess guiding, facilitating, and constraining features toward action-facilitating or -inhibiting affordances. This engagement with the environment and its materiality is perceived differently from one individual to another, which emphasizes people's and environment's sociocultural relation to affordances (Glaveanu 2012: 193). As people observe and populate their surroundings, they begin to form different types of emotional attachments to their familiar places. These diverse relations with places also become connected to the experiences that people have had with the environment's geological and physical elements (Laatikainen, Broberg & Kyttä 2017: 585). According to Laatikainen et al. (2017), the environment and its affordances also present a different attraction to people in different age groups, which shows the temporal relation between the environment and its qualities as the age of the observer influences the creation of the perception. Thus, the emotional perception of places can be seen to correlate with the opportunities that it can give a person. That emotional experience comes to influence the perceived attractiveness (or otherwise) of a location to, for example, certain activities (Savani, Kumar, Naidu & Dweck 2011: 684–686).

As can be seen, different design choices are intended to reflect the functions and features that an artifact can provide for use. Additional design modifications can represent diverse attributes such as the inviting, permitting, hindering, threatening, or user-friendly aspects of the artifact. While the attributes represent certain qualities, an intentional craftsmanship can emphasize the desired features to strengthen their perceivability and the correct transmission of the affordances (Costall 1995: 4776–477). Even though Gibson refers to the perceptual information as the information in the ambient optics, ultimately the holistic information can reveal itself as, for example, tangible, audible, odorous, possible to taste or possessing different visible forms (Gibson 2015: 223; Good 2007: 271). Since the information for perception is acquired from the environment in diverse forms, the knowledge about artifacts is gained in collaboration with the perceiving senses and the cognition of the world (Good 2007: 268–271).

This "social knowing," as Good (2007: 269) describes it, represents the formulation of knowing constructed from the interplay of mind, body, and environment. Costall (1995: 471–474) also emphasizes the importance of socializing factors in defining the affordances, as many of the artifacts that surround and are exploited

by people ultimately appear shaped by human intervention. Things, objects around us, surfaces, and even animals and plants have been confronted by this deliberate or unconscious human act. The act has changed the existence and characteristics of the objects, and how they invite or constrain our use of them. The meaning of an artifact thus changes and finds its form through the socializing intervention. One example of human experience, that of a child learning from their mother through observation, resembles how people learn to experience artifacts in their familiar community. Social learning also makes familiar the location-based uses for artifacts that have been found to be useful in the community, and thus an artifact attains its meaning based on the value it provides for the community in a specific location.

Despite all the innovative uses that a person can find for an artifact, Costall (1995: 472) points out that objects contain intended affordances, their meant functionalities, and that altered ways of utilizing an object might jeopardize its proper use. The misuse of an object can cause multiple consequences, such as breaking the object, or causing the discovery of a critical mistake or harm, like finding access to an unauthorized use for an artifact. The discovered effects can then lead to the proper fine-tuning of the objects for their safe and secure use.

3.3.5 The design of an artifact

Gibson's (2015) theory of affordances relies on the direct perception of opportunities in the surroundings based on the observer's discoveries. Gibson's explanation of the perception and the lack of the mental processing of information left much room for debate among representatives of different disciplines. Nevertheless, focusing on the object's design appearance is justified for the artifact to highlight its qualities for observation (Norman 1999: 39). Norman (1999) states that the information required for the successful design of things exists in the world, so the role of design is to provide the users with the critical clues that can be understood from the world. The design becomes the interpretation of an individual and illuminates their perception accordingly. The aim for an affordance is for its design to be visible to the observer so that its operation can be perceived easily.

The rapid development of technological artifacts, solutions and services is creating a complex mix of functionalities and different uses that gets incorporated into single devices. This technological sphere has created an environment that demands continuous updating and maintenance of the technologies; changes in operating logics; and demand for re-learning. It holds the danger of potential frustration, confusion, and mistakes. The principles of design aim to understand people and the needs that the interaction is meant to meet (Norman 2013: 8–9). After its

introduction, the design sphere eagerly adopted the affordance concept, and it became highly successful within the design industry as a means to describe and justify almost anything from the perspective of functionality. But in the course of this broad acceptance, the correct use of the affordance concept became distorted (Bærentsen & Trettvik 2002: 51; Norman 2013: 13–14).

Bærentsen and Trettvik (2002) questioned the applicability of the affordance concept to human-computer interactions, HCIs, in the form in which it was introduced by Norman (1988). The theory of affordances takes a dualistic view of perception where both the subject and the object define the possible affordances, and the perception is formed in a continuous observation as an act of observing and perceiving. The researchers argue that Gibson's notion of affordances from direct perception fails to account for the required aspects of cognitive psychology in the HCI setting, diminishing the suitability of the affordance concept for it. Bødker and Klokmose (2011: 319–321) join the argument by similarly questioning affordances and pointing out the lack of activity and dynamic reciprocal interaction in HCI communication. Norman (1999) responded to the controversy that his claims had ignited. Norman admitted that his original introduction of affordances in the book *Design of Everyday Things* contained some limitations that required further specification, especially those that related to the use of the computer interface. Norman (1999: 39) rephrased how in the field of HCI the possible actions should be referred to as perceivable affordances.

As such, certain principles of design create a rule of thumb for design and development work to find usable, functional, and empowering interfaces with which to interact, as Blair-Early and Zender (2008: 86) show. Following a set of principles creates a design strategy that aims to deliver the desired experience for the user (Dunleavy 2014: 27). Intended specifically for human-computer interactions, Norman (1988) introduced his design concept from Gibson's theory of affordances to stress the aspects of usability and functionality for the digital artifacts (Bærentsen & Trettvik 2002: 51–52). Along with the perceivable affordances, Norman (2013) nominated five other characteristics to support the applicability of the perceived affordances in the design of artifacts; these are signifiers, mapping, feedback, the conceptual model, and constraints. The concepts reveal the intended affordances to the user and promote a successful interaction with, and intuitive usability of, an artifact. They are laid out in Table 1.

Table 1. The principles for design (Norman 2013)

Perceived affordances

- The affordances represent potential opportunities, while preventative features are anti-affordances. Affordances depend on perceivability (i.e., what is discoverable and what is not). As the affordances depend on the relationship between an object and an observer, their discovery can be facilitated with conscious design choices.

Signifiers

- This feature represents design choices that promote the object's desired or restricting features and functionalities to the user. Signifiers transfer the properties of an artifact to the user in a comprehensible way, allowing the user to actualize the potential of an existing affordance. Within the artificial digital environment, functionalities need to be communicated to the user in an understandable manner, and thus the symbols guide the user to the artifact's successful and proper utilization. The signifier often takes the shape of an actual physical object, such as the time on a digital watch being illustrated via analogue means, or a computer's deleted files being placed in a folder made to look like a garbage bin.

Mapping

- The concept aims to create an understanding of, and ease of use with, the artifact's operations by implementing the user's natural insight in the design layout of the controls. Mapping utilizes the correspondence of a control to the outcome of the function, like a car turning right when the steering wheel is turned right, or like the light switches in a room following the same layout as the light placement therein. But as with many design choices, the cultural aspect of an insight also needs to be considered with the concept.

Feedback

- Feedback communicates the response of an operation back to the user. The feedback feature guides the user's behaviour and gives indications about either a possible interaction or an executed operation. In the same way that the human nervous system sends a response to the brain from such sensations as hot, cold, pain or pleasure, feedback reports on executed functions or warns the user about possible threats.

Conceptual model

- A conceptual model simplifies things by representing an otherwise complex operational event in an understandable way. A recommended conceptual model strives to simplify the operating process for the user so that an action can be easily understood even in a single glance. The connotations of a conceptual model reside in people's minds, so the concept aims to imitate people's understanding of how things function, behave, or look. Technological devices, for example, function in a complicated manner, operated by the

underlying software and hardware solutions that function in a complex relationship of cause and effect. These all exist on a non-need-to-know basis for the user of the device. A conceptual model provides an understandable explanation of the operating logic that promotes fast and accurate learning, ease of use and sufficient understanding in case of failure. It is rarely necessary to know our digital devices inside-out; frequently, we just need to know how to use the printer.

Constraints

- The fundamentals of design interaction exist to eliminate, inform about, or otherwise by-pass existing constraints. The feature of constraints permeates the environment as natural physical constraints or as features of the artificial creations. Design choices can illustrate cues for the user about the restricting, harmful, or safety-related constraints within the operations. But as the constraints can prevent actions, they can also be used to guide a behaviour in a desired direction.

Norman's (2013: 10-30, 123-124) principles for the design of everyday things and especially for computer-presented interfaces provide elements that first of all support the aim of good user experience, but also derive from the characteristics of affordances. Norman's design principles aim to provide functional guidelines to design artifacts and solutions in a way that resembles the intended affordances and presents the intended use most effectively and without misinterpretative potential. The principles of signifiers, mapping, feedback, conceptual models, and constraints all function to clarify the perceivability of the affordances to the potential user. The design principles provide an insight into the creation of the digitally provided affordances.

3.4   The creation and co-creation of digital affordances

Considering the expected impact of digitalization, service design has a crucial role to play in how the services will be welcomed. The integration of new digital means introduces a huge learning curve for users connecting with new methods. Dunleavy et al. (2005: 486–487) describe how the potential for mismatch grows significantly as digitalization introduces changes to the service providers as well as to the citizens. The possible pitfalls need to be addressed with anticipatory developmental work, as digital transformation interferes with interactions as well as the artifacts and services. The spread of these effects impacts the whole digital ecosystem, which presents itself quite differently to different people. The outcomes emphasize the meaning of the user-centered approach in the utilization of services, as the service encounter and product usage need to be well designed for optimal usability (Bødker & Klokmose 2012: 448–450).

Along with the rapid technological development, the consumer needs and preferences are experiencing a simultaneous change and shift in the direction of what digitalization can provide. The affecting forces are coming from technical development itself but also from the global movement of information and its influences. These factors already address the importance of a well-designed service system that functions effectively and provides a desired customer experience. Moreover, the service sector has enormous influence on the wealth and employment rate of developed economies. A trusted and well-functioning service system is vital for a balanced economy (Verma, Fitzsimmons, Heineke & Davis 2002: 117). The affordance perspective creates a pathway to understanding the user's perception and builds the awareness of the holistic view necessary to take advantage of the potential of digitalization (Volkoff & Strong 2013: 821).

As already mentioned, an environment and its artifacts can have a diverse set of affordances as they ultimately rely on the observer's abilities and imagination (Gibson 1979: 137–140). A user-centered development focuses on understanding people's needs and abilities, and the usability of products and services lies at the heart of it (Ritter, Baxter & Churchill 2014: 43). User-centered design thinking in a development process strives to create a match between people's diverse views and the functions and appearance of the created solutions. The first stage of development is to create a fundamental understanding of people, so that the design outcomes can fulfil their purpose and also, in the best-case scenario, produce joy and satisfaction in their users (Norman 2013: 218–219). The diversity of people's knowledge and understanding creates a challenge to development, as it presents a variety of needs that must be met. Digital artifacts can already offer multiple functionalities and their growing complexity can easily produce confusion in people. The abstract nature of digitalization, along with the specialized terminology related to artifacts' use, creates an unwanted confusion and becomes a target for design development to solve (Kramer, Noronha & Vergo 2000: 47).

In the design of usable and desired solutions, the notion of co-creation can contribute to the quantity of perceptual information and increase the potential value of the development outcomes by signaling larger groups' wants and needs of the development process. Researchers like Osborne, Nasi and Powell (2021); Osborne, Strokosch and Radnor (2018); Brandsen, Steen and Verschuere (2018); and Torfing, Sørensen and Røiseland (2016) have introduced the concept of co-creation for the public sector arena. The activity of co-creation makes user values and desires apparent for the development, helping to create problem-free solutions of which the users can take advantage. In Torfin et al.'s (2016: 7-8) definition of co-creation, it enables the consideration of multiple perspectives in a joint creation that maximizes the value of the outcome by bringing together different resources and

capabilities. Researchers also remind us that co-creation appears synonymous with other concepts, such as co-production, co-planning, co-design, co-delivery, etc. As with the subjective nature of affordances, the user-centered design, or human-centered design, aims to reveal the user's preferences (Chammas et al 2015; Norman 2013: 8). The development concept of participatory design stretches the user-centered design concept to more broadly engage people in co-creation (Bratteteig & Wagner 2016; Constantino et al. 2014; Vines et al. 2013).

Despite the positives of the co-creation approach, collaborative activity also hides some potential points of failure and threats to the process. Jalonen, Puustinen and Raisio (2020: 3–4) show how failures can distort the process, the participation, the outcomes, and the overall trustworthiness of the co-creation activity. Their observations remind us of the necessity of respecting the ideals, where all participants have equal rights to express their opinions, their insights are incorporated in the final decision-making stages, the process of co-creation is arranged to involve relevant members, and the outcomes are rightfully considered.

The co-creation aspect quickly becomes relevant when considering (for example) situations in work surroundings, as Brandsen, Steen and Verschuere (2018) describe. Nelson et al. (2017: 55) remind us how, in the case of work practices, the technological dimensions are materialized through employees taking advantage of the solutions. The digital technology and co-creation approach can support the discovery of new and hidden practices, as Lember, Brandsen and Tõnurist (2019: 16–17) found when they examined digitalization and co-creation functioning in a mutually supporting manner. The researchers refer to the technologies' affordances and appearance in Gibsonian terms but also remind their readers that the social environment modifies the request for the technology affordances. As Vaast and Kaganer (2013: 80) observe, while the materiality of the objects might appear stable, the affordances they provide can vary significantly according to the user and use case.

Digitalization, software, and hardware solutions are hoped and expected to be productive and usable for their intended work purposes. But as Leonardi (2011: 147-148) points out, the work environments in question might vary considerably, despite which the solutions are still expected to function well. As IT provides tools for mastering different elements of organizational changes with processing power, communication, and integration capabilities (Zammuto et al. 2007: 751), the affordance perspective helps to provide the means to understand the diverse use cases of the digital solutions (Vaast & Kagnar 2013: 80; Leonardi 2011: 152). Since the affordances do not appear independently of the relation between artifact and actor, the affordance type is determined by multiple aspects of how it is and has

been perceived. Granted, some artifacts appear with a design such that the object's affordance is obvious to anyone (Anderson & Robey 2017:101–102). This was Norman's (1998) aim when they introduced the concept of affordances to the field of design in the hope of achieving functional-appearing, user-friendly solutions (see Table 1).

But technology is changing the artificial objects in our physical environment, as well as transforming some of them from physical to virtual form. At the same time, the transition changes the appearance of the technology from something known to something abstract that requires a new approach for perception. As D'Ambra, Wilson & Akter (2016) describe, the case of e-books shows how the reading experience will increasingly be perceived differently to historical understandings of the activity. Digital interfaces are expected to interfere even more in interactions with artifacts. This changes the interface experience for reading and the physical activities related to the process (D'Ambra, Wilson & Akter 2016: 2–3). Anderson and Robey (2017: 101–102) write of the value of considering the social factors that affect the emergence of affordances. And as such, the permitting or constraining forces should be detected for the actualization of the affordance. The appearance of the solution heavily affects the potential of the technology in question: it asks how the affordance is perceived and where the perception guides the artifact's use.

Hutchby (2001: 441-442) emphasizes the importance of the social perspective to technology, as he introduces the technology aspect as a secondary element; he considers the social and interactional approach of technology to have primacy in how artifacts gain their meaning. The social factor reminds us of how an object can have a wide range of affordances depending on the subjective interpretation. The work environment social context can generally be understood as coming from the human-related work practices that appear in work routines, relationships, and job responsibilities, but also in the material aspects of workstations and the physicality of human expression (Anderson & Robey 2017: 101–102). McGrenere and Ho (2000: 7) introduce the concept of the degree of an affordance, representing the range of affordance perception, as shown in Figure 10. Figure 10 presents a two-dimensional vector describing how an affordance can still be perceived even though the presentation differs. According to the degree of an affordance, its realization increases according to the clarity of the perceptual information.
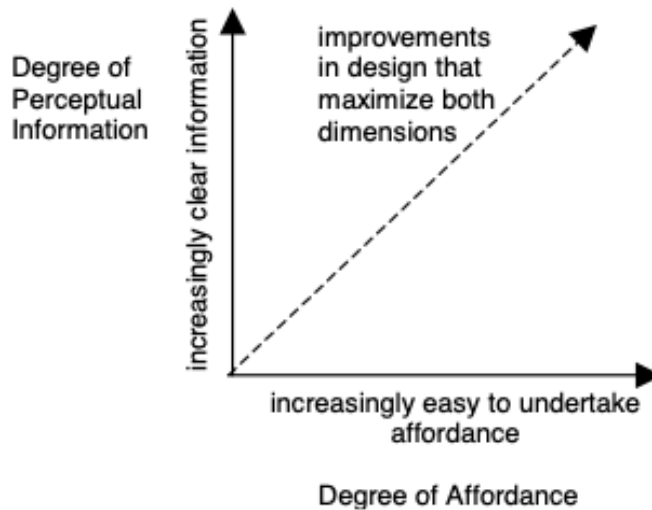
Figure 10. The degree of an affordance (McGrenere & Ho 2000: 7)

In a co-creation setting, the insights and understanding of the user group can be brought to the development of the design and function of artifacts and solutions, which can then impact the degree of an affordance by maximizing the clarity of the perceivable information. Osborne, Nasi and Powell (2021: 6–10) recognize co-creation as adding value to the user but also to the services' short- and long-term benefits. The co-creation of affordances is tested later, in this study's empirical phase: user groups were approached in a collaborative fashion, as is described in Chapter 4. In the research and development process, the benefits of a participatory design approach and deliberative democracy were combined for the co-creation of digital artifacts, services, and solutions. Collective problem-solving and idea creation depend greatly on the sharing of knowledge and experience, which Brophy (1998: 203), for example, declares surpass the potential of an individual outcome due to the increased perspectives within the creative process. The novel and innovative outcomes that the creative process can produce appear highly appreciated for the organizational environment, as Amabile (1988) identified decades ago. The area of technology especially provides promising grounds to present something that has not been introduced before: the micro-computer introduced by Steve Wozniak ended up steering the development of a personal computer market (Amabile 1997: 40).

4 THE RESEARCH METHODOLOGY AND THE EMPIRICAL SETTING

The digital medium, the theory of affordances, and the co-creation of digitalization come together as the research framework depicted in Figure 2 presents. Being intertwined, all the concepts influence each other in utilizing digital technology's opportunities and recognizing its challenges, requirements, and dysfunctionalities. The intertwined nature of the elements sets requirements for the research methodology to capture the interactions between the dimensions. As the research philosophy makes clear in Chapter 1.3, the subjective perception of a phenomenon demands a descriptive research approach that then directs the empirical setting towards qualitative data gathering.

The research setting brought together a wide variety of people who were involved in development. Co-creation included inhabitants of the chosen rural areas and the stakeholders involved in hospital organization operations. The Digital Café and the Organizational Jury approaches represent a method of engaging the content-related representatives in the co-creation of digital services, solutions, and artifacts. The projects included the aim of detecting and discovering the opportunities of the digital medium, in addition to the innovative user-driven digital services, solutions, and artifacts. The research methods were further guided by the features and principles of the participatory-deliberative design process, as described in Chapter 4.1.

The research methodological approach is adopted from the field of deliberative democracy, where the processes of the World Café and the Citizen Jury are well known. Within this study, the methodological approaches are designed to follow the principles of the introduced concept of Participatory-Deliberative Design. The approach methods were labelled 'Digital Café' and 'Organizational Jury'. The organizational jury represents an evolution from the Citizen Jury method to meet development's organizational setting (Värttö 2019; Lindell 2017).

Chapter 4.2 introduces the research setting of the Digital Café and the Organizational Jury, explaining their configuration and development. The chapter goes on to discuss the abductive research approach (Chapter 4.3) and the empirical content analysis process (Chapter 4.4). The gathered research data represents a qualitative research approach that enables the details of the participants' perceptions of and thoughts on digital transformation and its utilization to be revealed. As Alasuutari (1999: 30-33) states, qualitative research represents an approach that enables logical reasoning that directs towards a deep understanding of the research phenomenon. As such, qualitative research serves the research purpose for hermeneutic

phenomenological study well, approaching the existence of knowledge through the subjective perception of the participants (Hirsjärvi, Remes and Sajavara 2009: 129–131).

The qualitative research data is analyzed via abductive content analysis (see Chapter 4.3), where the theory and the empirical data engage in a dialogue to create an understanding of the target phenomenon, as Jalonen, Kokkola, Laihonen, Kirjavainen, Kaartemo and Vähämaa (2021: 803–804) describe. Kovács and Spens (2005: 136) describe abductive content analysis as a method for "systematized creativity or intuition in research to develop new knowledge", which well describes an approach for forming an understanding of users' perception. The analysis process enables the forming and structuring of the findings according to the dimensions of the theoretical framework (Chapter 4.4). Based on the research analysis, the empirical findings are structured in the following categories (see Table 6):

- The digital medium

- The perception of digitalization: the self, the surrounding, and the digital artifacts

- The digitalization or artifacts, services, and solutions

Before introducing the Digital Café and Organizational Jury research settings, the chapter explores the concept of the participatory-deliberative design, followed by the process and structure of the abductive content analysis of the research data.

4.1   The participatory-deliberative design

The nature of digitalization has proven how the functionality and usability of a digital artifact is gained in part by its appearance to the user (see Ritter et al. 2014; Maceli & Atwood 2011). The appearance presents the functionalities and elements of attraction intended to draw the user to the digital solution. These features are controlled by the design choices that act to transmit the desired experience for the user, whether it be a desired functionality, aesthetic, level of usability, value, or any other feature from the wide range that an artifact can offer its beholder (Norman 2013: 10).

As digitalization progresses, the involvement of the users has become increasingly necessary for achieving the desired functionality and outcome of services and solutions. The importance of users' participation appears especially critical in the complex field of technology. Among health technologies, for example, the advances

of mobile technology are increasingly redirecting the locus of control towards patient-driven decision-making, strengthening the role of patients not only as users but as agents responsible for their care (Grosjean, Bonneville & Redpeth 2019: 6).

The meaning of participation emphasizes the fact that included parties should, in democratic fashion, have the right to affect the choices concerning them. But it also means that users obtain critical knowledge and have sufficient creativity to make a valid contribution. The participatory mindset encourages the values and effects that users can provide for the whole design process and outcome. The participatory aspect recasts the stakeholder relationship, with the organizational party and the users being considered as contributing mutual value to the design and development process (Constantino, LeMay, Vizard, Moore, Renton, Gornall & Strang 2014: 17). The respect afforded to these values is reminiscent of the democratic order that resonates with the theory of deliberative democracy, as Gutmann and Thompson (1997), Cohen and Fung (2014), Munno and Nabatchi (2014), Raisio and Vartiainen (2015), and Leino, Kulha, Setälä and Ylisalo (2022) describe.

This study presents a participatory-deliberative design approach as a fusion of the principles of the participatory design approach and the principles of deliberative democracy. These methodological approaches present certain similarities, especially in relation to their user or citizen involvement aspect, just with a different focus on usability development (Bødker & Kyng 2018) or societal policy (Carson & Hartz-Karp 2005) respectively. Bua and Escobar (2018) utilized the participatory-deliberative process description by discussing the participatory and deliberative processes in public administration for the reforming of policy and the involvement of citizens in decision processes.

In addition to the methodological similarities, the mutually recognized presence of wicked problems within the design and decision-making processes also ties the two collaborative approaches together (see Rittel & Webber 1973; Buchanan 1992; Johansson-Sköldberg et al. 2013; Raisio, Puustinen & Vartiainen 2018). The following chapters provide a general explanation of the principles and practices of the methods and the ways in which they intertwine. Later in this study, the characteristics of the participatory-deliberative design are utilized in the empirical approach of user groups innovating for the utilization of the digital artifacts and solutions.

This chapter introduces a methodological concept that ties these perspectives together and directs their goals to a mutually accepted target. Figure 11 shows how the collective activity of co-creation interacts with the features of the digital medium as well as the affordance perspective to form a new understanding of the existing opportunities.
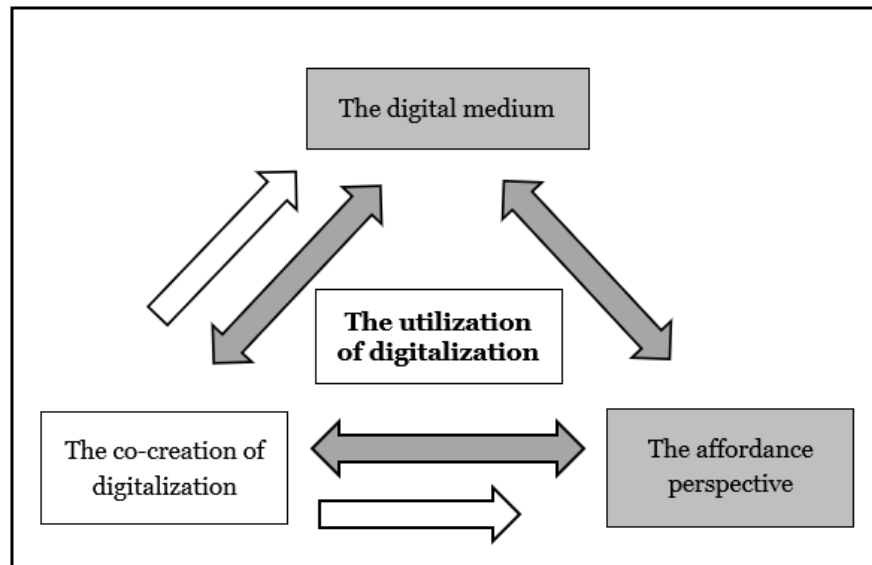
Figure 11.   The impact of digitalization co-creation

Participatory-deliberative design offers a way to form an understanding about the appearance and features of the digital medium, as well as about the people forming their insights about the medium.

4.1.1   The idea of co-creation in digital development

It is not uncommon to declare that a certain degree of creativity is highly appreciated in developmental work, given that it thrives when producing ideas, solutions, or products in previously unpresented forms. Characterizing the creative outcomes is their unique and novel appearance, and they are frequently also described in terms of their usefulness and their aesthetically appealing qualities. Also related to the creative outcomes is the notion of their offering valuable knowledge of a certain domain (Black, Freeman & Stumpo 2015: 131–132). Black et al. (2015: 132) define creative thinking as "the flexible innovative application of domain-specific knowledge resulting in a novel and useful products or creative solutions to a clearly defined problem", which emphasizes the thinking process that involves the features of divergent thinking as a way to produce multiple options for evaluation and convergent thinking as a counterbalancing measure for weighing the different possibilities and for deciding the best possible option. Both of these are seen as essential for the creative process.

The creative aims in development often meet with the expectations of a design process, which strives to reform existing states by creating solutions and designing choices to satisfy apparent needs, desires, and dissatisfaction. As Razzouk and

Shute (2012: 330) mention, the design process is problem solving that often appears so commonplace that people do not even realize that they are performing the act of design. The process of designing involves the act of creative thinking in the generation of ideas for problem solving, together with the ability to form a holistic view of the considered issue and readiness for teamwork for an enhanced result (Razzouk & Shute 2012: 331).

A participatory design process seeks to enhance the opportunities generated by a creative design process by bringing multiple solutions and views to be evaluated. This collaborative design process executes much of the divergent and convergent thinking perspectives through focused sharing of views and ideas in a collaborative fashion, where ideas are presented and evaluated from multiple perspectives (Jensen, Thiel, Hoggan & Bødker 2018: 611–614). In this study, the co-creation aspect is organized by the participatory-deliberative design process, which functions as the working instrument to gather people's perceptions of the digital medium and form mutual insights about its utilization possibilities (see Figure 2). It also engages stakeholders in mutual development, as McMullin and Needham (2018) did when utilizing co-creation in the healthcare domain.

Participatory design stresses how participation forms an essential part of a good design, as it emphasizes the meaning of users' insights and the importance of appropriate tools and methods for improving work and life surroundings (Bødker & Halskov 2012: 149). As Smyth et al. (2018: 2) declared, participatory design addresses the importance of users' rights to influence the development of the systems that directly affect them. Bødker and Halskov (2012) bring out a few key factors of the participatory or cooperative design process from Greenbaum and Kyng (1991), who emphasize the importance of engaged users to the design process and acknowledge computer systems as important tools that provide value and the means to increase quality. The user perspective also emphasizes the importance of opposing opinions in the development process as well as the situational aspect of development coming from the user's insight. For a workplace environment, the design process needs to recognize the appropriate goals for enhancing the overall skills in work situations. But as McMullan and Needham (2018: 154–155) explained, with reference to the sensitive field of healthcare, the work culture also presents inhibiting borders to co-creation. Researchers recognize a barrier between the individual approach and co-production, with professionalism influencing the interaction within services, and legal liability issues affecting the services.

The notion of participatory design connects strongly to the development of information and communication technology, as ICT is providing ever more opportunities for people to engage and cooperate in ICT artifact design processes.

Participatory design approaches are particularly suited to the ICT field, as Joshi and Bratteteig (2016), Bødker (2015), and Gregory (2003), among others, observe. The co-production and co-creation approaches generally involve opportunities for the use of ICT, as Lember, Brandsen and Tõnurist (2019) state. Bødker (2015) describes how the development of participatory design has followed the evolution of technologies, which provide not only the means for stronger participation on design but bring participation, collaboration and sharing into everything utilizing the advanced technologies. Thus, participatory design should evolve side-by-side with technological achievements. Yalman and Guclu Yavuzcan (2015: 2245) highlight how participatory design represents a design notion that presents similarities to other concepts of collective design, collaborative design, and co-design that all appear as facets of a broader concept of human-centered design. And thus include the human perspective in design in partner with the technology aspect.

Vines, Clarke, Wright, McCarthy, and Olivier (2013: 431) elaborate on the requirements for change management, as it queries whether to reform existing operations and structures or to reimagine totally new approaches. Both views require adaptation and integration from the stakeholders, and a balanced approach involving both might be preferable. Nevertheless, design requires an awareness of the existing contextual framework, whether it acts as a limiting structure for the choices or as liberating one for the participants' imaginative resources. The context of technology provides resourceful opportunities as developments grow ever more sensitive to users' needs and wishes. The utilization of technology requires an understanding of the users' perceptions of the technological offerings and restrictions. Bødker and Kyng (2018: 4–7) add how the evolving *role* of technology needs constant attention due to the evolving *nature* of technologies and their utilization. Users have a beneficial role for design as they possess relevant knowledge and skills, but as knowledge and skills change, design's attention needs to be on future impacts.

In a dynamic state of development, the performance and success of the contextual knowledge base needs to be constantly updated, whether it is organizational or individual. In an organizational environment the knowledge is structured around the cognitive capital of organizational systems; the interaction patterns and relationships within the organizational culture; and the context-related knowledge that individuals possess. Overall, structured knowledge capital can be understood as comprising mental models, i.e., mental representations of people's past experiences, knowledge, and skills. In changing situations, individuals are required to adapt to the new perspectives and adjust their context-related thinking (Uitdewilligen, Waller & Pitariu 2013: 127–129). A team approach is commonly used to gain a collective perspective on organizational performance and effectiveness. The

collective approach brings the prevailing beliefs, attitudes, ideas, procedures, and policies for the group to reflect on (De Dreu 2002: 285–286). Aramo-Immonen, Jussila and Huhtamäki (2015: 1154–1155) go on to explain how collaborative activity produces collective learning that gathers the members' informal, and formal knowledge to form mutual knowledge capital. The researchers' remind also about the learning that takes place outside the work surrounding etc., referred as non-formal information. Koskinen and Aramo-Immonen (2008: 194–195) further explain how the knowledge can be distinct from data and information, as data and information include the unprocessed and processed facts, whereas knowledge reflects the perceptions, capabilities, and experiences in an individual's possession that are a vital asset for developmental work.

Explaining team performance from the mental model perspective, Uidewilligen et al. (2013: 130–131, 152–153) identify the existence of two essential characteristics: similarity, and accuracy depicting organizational performance. For the mental model, similarity refers to the distribution and overlapping of team members' mental models, which is shown to facilitate team performance and accuracy depicting optimal decisions. Even though learnt behavior and thinking in a team provide stability and predictability for operating, which in turn provides performance gains in a stable situation, new adaptability and updated mental models are required when forced to function in a dynamically changing environment. As the environmental situation changes from static to dynamic and introduces uncertainty, team performance requires a flexible adaptation of new knowledge structures to respond successfully to the changing circumstances.

De Dreu and West (2001) reveal in their study how group dissent suggests better success. The outcome results from the divergent thinking in which the differing opinions enhance opposing arguments and differing views promote groups' cognitive complexity and prevent premature consent. However, the process could easily lead to defective decision making in the absence of thorough and critical processing of the arguments. The approach of deliberative democracy in turn acts against the inhibiting forces and decision-making deficits as a result of its principles (see Chapter 4.1.4), which ensure high-quality outcomes of its processes (see Carson 2011; Cohen & Fung 2004; Nabatchi 2010; Munno & Nabatchi 2014; Ackerman & Fishkin 2002). Effective team participation extends from the creation of divergent ideas and solutions to the implementation of those ideas. Team performance does not come only through divergent thinking but also from the overlapping knowledge between the group members, which ensures effective communication and interaction between people, as the above-presented mental model's similarity and accurate descriptions demonstrate. The shared understanding

creates a stronger holistic awareness and enables the creation of novel linkages and associations beyond individual capabilities (De Dreu & West 2001: 1192).

4.1.2   The fundamentals of participatory design

Participatory design, PD, has been heavily involved in the field of technology, which is a prominent area of development involving the collaborative approach. The development of technological solutions and systems constantly changes the nature of human-computer interaction, with dimensions that can appear challenging for the users. The pervasive and mobile integration of technologies, along with the complicated configuration of various interfaces, invades homes and offices and injects itself into people's working lives and leisure time, but it also connects the different environments together seamlessly. The ubiquitous nature of technology blurs the boundaries between different areas of life, which while providing enormous benefits also comes with unique challenges, especially regarding the social aspect of technology usage (Bødker 2006: 1–2).

Namioka and Schuler (1990) introduce the PD approach as a way to emphasize the fact that technology enables greater success in work by providing useful tools for the job. For that reason, workers are seen as experts at evaluating their needs and determining best practices to get the job done. The PD ideology sees the collaborative approach as vital for the integration of computer systems and applications. In Bratteteig and Wanger's (2010: 51) words, participatory design aims to "involve practitioners in expanding the space for design ideas," which emphasizes the effect of stronger participation providing better functionality for the design projects as well as more creative outcomes. Creativity is something the researchers present as a core characteristic for design, which (simplistically) presents itself in the feature of novelty. The participatory design process thrives by maximizing the creation of possible functional outcomes through collaborative ideation, which numerous creativity researchers also relate to the potential for creative outcomes (e.g., Amabile 1988; Taggar 2002; Njistad & De Dreu 2002; West 2002).

In 1990, Namioka and Schuler introduced the first Participatory Design conference, which brought global actors together. PD practices had a strong heritage in European and especially Scandinavian research fields, which at that time deserved broader global acknowledgement. Borrowing from Czyzewski, Johnson and Roberts, Namioka and Schuler (1990) described the meaning of participatory design as emphasizing the user's role in design, as individual insight and perception defines the solutions to be used. Their statement makes clear the importance of the user view:

"...user's perception of technology as being at least as important to success as fact, and their feelings about technology as at least as important as what they can do with it".

The development of technologies blends boundaries, as has become apparent with the blurring of work and leisure time. This reminds us of the importance of reforming our understanding of users' perception of technology as its development evolves. Bødker (2015) concludes that participation needs to be reconfigured to meet the realities of the current use and experience of technology. The participatory design process was originally created to enable users' voices to be heard when creating IT and IT systems for the workplace. The objective is to include the user's expertise in the design of newly developed artifacts to ensure the full functionality of the technological solutions. Participatory design aims to ensure the enabling value of technology is foregrounded, rather than having it become a constraint on work practices (Grosjean et al. 2019: 10).

In 2015, Bødker returned to the topic of participation and sharing in the context of technology as the so-called third wave of technology had become more apparent. Bødker (2015: 24–25) describes the evolution of the technology of human-computer interaction as occurring in three waves, with the first wave focusing on recognizing the human factors in the human-computer encounter. The technology-related design processes were approached from the top down, rather than from the user's perspective, setting the focus more on the technological aspects (Grosjean et al. 2019: 7). The second wave concerned well-established practices in a work setting, focusing on groups utilizing a variety of applications. The second wave acknowledged the value of sharing and participation as co-operation and co-creation were embraced for the utilization of technology. In the third wave, technology started to break the boundaries between work and leisure as the use context and applications broadened and intermingled. Where the second-generation focus was restricted to specific work practices and use cases, the third wave drew attention to human experience and other areas of human life, such as its cultural and emotional aspects (Bødker 2015: 24–25; Bødker 2006: 1–2).

Due to the complexity of and potential confusion surrounding developing technologies, the field of technology represents a suitable context for the participatory design approach. Participatory design offers a way of engaging and integrating context-relevant actors in the design process in order to utilize their views and expertise for the design outcome (Grosjean 2019: 7–8). At root, participatory design proceeds from the idea that those who will use a product or service should be involved in the decision-making related to the design of form and function (Bødker & Halskov 2012: 147; Constantino et al. 2014; 17; Joshi & Bratteteig 2016: 2; Kyng

1991: 66). Kyng (1991) talks about the importance of user involvement to the design process, which consequently strives to overcome the dissatisfaction related to the use of computer technology and IT systems in work practices. The objective arose in the 1970s when companies started using computer systems and the requirement for user involvement in the design process was acknowledged as the solutions appeared too complicated and didn't therefore fulfil their full potential. Kyng (1991) refers to co-operative design as a way of combining designers' and users' knowledge base into one mutual pool of learning that aims to produce better and more satisfying. Kyng (1991) synonymizes the meanings of co-operative design and participatory design as both concepts advocate similar collaborative activity.

Regarding the basic principles of participatory design, Joshi and Bratteteig (2016: 2) build on Kyng's (1991) notion about the importance of mutual learning between users and experts, as each possesses critical knowledge about the context gathered from their unique perspectives. Joshi and Bratteteig (2016: 2–3) emphasize the meaning and value of the users, as their expertise from the user's unique point of view provides a critical factor for the PD process. Users' involvement brings two different worlds together, where mutual learning is both a critical requirement and the potential platform for creative development. In the process of participatory design, members are required to learn from each other, form a common interaction for mutual understanding, and obtain the ability to view opinions and perspectives from each other's point of view. Similarly, Bødker and Halskov (2012) refer to Greenbaum and Kyng (1991) as they describe the ideals of participatory design as forming from the need for user involvement in the design process, having workplace skills as the goal of activity, perceiving computer systems as tools and seeing their potential as a means of increasing quality, acknowledging the design process as inherently political and containing interrelated conflicts, and finally understanding the use context as the fundamental starting point for the design process. Bødker and Halskov (2012) also recognize the earlier work of Namioka and Shuler (1990) as matching the ideals presented by Greenbaum and Kyng (1991), as introduced previously in the text.

In 2015, Halskov and Hansen published research analyzing a decade of work in participatory design, as the field was then 25 years old. Halskov and Hansen (2015) examined 102 research papers published for the Participatory Design Conferences (PDCs) between 2002 and 2012. Within the work, the researchers addressed the reformulation of the fundamental aspects of PD based on the synthesis of the core PD literature. The fundamental aspects of participatory design introduced by Halskov and Hansen (2015) comprise the aspects of politics, people, context, methods and product (Figure 12).

Politics	People who are affected by a decision should have an opportunity to influence it
People	People play critical roles in design by being experts in their own lives
Context	The use situation is the fundamental starting point for the design process
Methods	Methods are means for users to gain influence in design processes
Product	The goal of participation is to design alternatives, improving quality of life

Figure 12. Fundamental aspects of participatory design (Halskov & Hansen 2015: 89)

The fundamentals of participatory design, as conceived by Halskov and Hansen (Figure 12), reflect collaborative design activity by considering the features and restrictive factors within the five categories. 'Politics' responds to the user-centered view of participatory design, as the ones impacted by its development should have the right to influence its appearance and functionality. 'People' emphasizes the human capital that offers hidden insight and knowledge related to artifacts and processes as well as their motivational, ideological, and functional values. The next category highlights the context relatedness of design. Usability and functionality should be thought of in terms of the surroundings in which the solutions are meant to be utilized. Creative ideas from outside those surroundings can still be brought to the discussion and implemented, as novel uses of known ideas in a new context. The methods act as the enabling platform for the sharing of information, knowledge, and mutual learning so that participatory design can take place. Finally, 'product' maintains focus on the outcome, producing results that adopt the previous characteristics while aiming in the desired and intended direction.

4.1.3   From the participatory design process to decision-making

As the participatory design approach seeks to involve users in the design process, the motivation for collaboration is often affected by case-specific factors. The practice of participation demands different approaches depending on the motivation for involvement, i.e., whether the interest emerges from an obligation to participate or from a more willing approach to finding alternative practices for daily tasks (Bratteteig & Wagner 2016: 425). Despite the differences in participation motivation, the act—defined as mutual learning through the act of collective reflection—still plays a critical role in participatory design (Andersen et al. 2015: 252). Bødker and Kyng (2018: 6) present the designing of things as the core of PD; for example,

work and technology are tied together technically as well as socially and thus the process requires the user's perspective to bring an understanding of the context to the decision-making process.

Bødker and Kyng (2018: 6–10) go on to explain how the changing technological medium alters the user's context-relevant knowledge and skills base requirements, which must be updated with the introduction of new technological means. The design aspect should still be subject to user desires and capabilities, even if related factors such as politics and infrastructure changes might introduce potential conflicts and inhibiting forces on the design decision-making process. Pedersen (2016) touches on this topic when he discusses "design before design", which highlights the importance of raising interest in the issues to be addressed and arranging a favorable space for participation, since the interest in engagement should not be considered self-evident.

Pedersen (2016: 172) illustrates this with an example from the actor–network theory (ANT) perspective, which stresses that consent is never just given but needs to be actively proposed, convinced, forced, or seduced for people to be willing to engage. With this in mind, participatory design practices should be arranged by honoring the participants' interests and organized in a diplomatic and peaceful manner that represents a stage of negotiation (Pedersen 2016: 179–182). Joshi and Bratteteig (2016: 2–3) recognize the requirement for the deliberate approach as they base their introduction to the participatory design process on mutual learning. Cross-learning and -understanding provide an insight into collective perception. The objective of mutual learning is to enable participants to understand the thinking and operating logic of other domains, which fosters imagination, broader thinking and the ability to build ideas on top of each other.

Along with the mutual learning, the participatory design emphasizes co-creation, where participants work together through the stages presented in figure 13. Joshi and Bratteteig (2016: 2–4) present the process of participatory design as occurring through the steps of *planning*, *investigating practices*, *identifying needs and wishes*, *specifying requirements*, *concretizing design suggestions*, and *testing and evaluating in use*. The process progresses in an iterative fashion where each step evolves over time and builds awareness about the issues dealt with, offering different viewpoints for the next phase. By way of example, the identification and gathering of needs and wishes are conducted simultaneously with recognizing and defining the existing problems. The iteration of knowledge also overlaps different steps, as the concretizing of design ideas can simultaneously produce solutions to problems as well as clarifying the definition of existing problems.
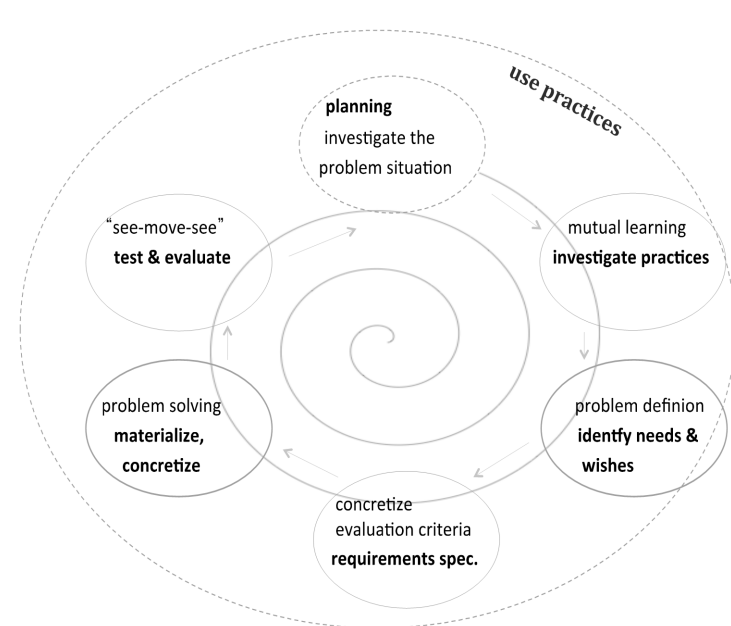
Figure 13. A model of participatory design process (Joshi & Bratteteig 2016: 3)

Recognizable in Joshi and Bratteteig's (2016) model of participatory process is the emphasis on the iterative gain of knowledge and production of results, which happens through collective co-operation. The model presents an aspect of mutual learning, as people's involvement enables the gathering of insights and identification of the requirements for better designs. The act of participation requires willingness to engage in co-operative communication and behavior as well as the ability to direct decision-making according to the collective opinions. Vines, Clarke, Wright, McCarthy, and Olivier (2013) conclude that the required conditions for a participatory design process focus on sharing control, sharing expertise and being willing to adapt and engage in change.

The participatory design process sets the balance of control in a new structure that is unknown to many actors. The right to influence divides the control between the users in a democratic fashion that is built into participatory design process. It also enables the voices of the previously unheard to be heard. This introduces marginal groups into the decision-making process, as these users should be equally heard when gathering new insights into the design outcomes (Vines et al. 2013: 430). Related to the shared control is the acknowledged expertise of people whose insight, knowledge, and values are utilized as vital sources of information. The knowledge in users' possession should be shared and exchanged with other relevant members of the design process. This exchange of either explicit or tacit knowledge can reveal important aspects for development, like safety-, function-, or usability-related factors. Some of the information exists as intangible capital,

which usually requires an approach of great diligence and sensitivity to gather and perceive the information, as Vines et al. remind us (2013: 430–431).

Yalman and Guclu Yavuzcan (2015) argue that users become co-creators in participatory design, which presents a shift away from the user-centered design approach. The co-creation positions the participants more as partners with the other engaging stakeholders. In participatory design, the heterogeneity of the involved parties increases though the number of perspectives on the design work, thus enabling a greater variety of point of views compared to a traditional user-centered approach. The benefits of divergent knowledge in design and decision-making have long been acknowledged, since the fundamentals of participatory design date back to the citizen forums held in ancient Greece. Since then, PD has become widely known, especially in Scandinavian research, from the 1970s and gaining more widespread recognition by the 1990s. Yalman and Guclu Yavuzcan (2015: 2245) conclude the following about the meaning and value of PD:

> *"Participatory design does not just ask users opinions on design issues, but actively involves them in the design and decision-making processes".*

The decision-making process requires widening the range of choices before making the final decisions that lead to concretizing the design solution. In design approach, the existence of complexity around decision-making has been recognized as holding challenges now described as wicked problems (see Buchanan 1992; Johansson-Sköldberg et al. 2013). The complexity of choices justifies the collaborative approach for mutual decision-making and evaluation as organized in participatory design processes. The participatory design approach increases the users' autonomous position and opportunity for influencing the ultimate design results. The increased participative role authorizes the member as co-creator to produce ideas and as evaluator to judge them (Bratteteig & Wagner 2016: 425–428). Bratteteig and Wagner (2016: 431–438) remind us of the existing dynamic between the choices and control factors involved in participatory decision-making. Unbalanced choices and roles affect the decision outcomes and therefore require thorough consideration of the decision-making validity.

Bratteteig and Wagner (2016: 435–438) continue by stating that as participatory design processes are about discussing, proposing, and evaluating presented solutions, the presence of power relations that influence the group dynamics are difficult to remove and can easily come to interfere in the process and influence the created solutions. Although the unequal distribution of knowledge, skills, and organizational resources in the context of work is the strength of collaborative development, these features can easily turn against the process in the case of misuse of

authority. While existing power and control issues can distort the functioning of the PD process, the truthfulness of the process outcomes should be kept as the driving force and a factor of commitment within the process. Other concepts like trust and loyalty also appear as influencing factors and reflect the value of 'right to influence', as shown in the fundamental aspects of participatory design (Figure 12).

Buchanan and O'Connell (2006) explore the concept of decision-making, which ultimately aims to achieve optimal results for given resources but is bound by the complexities of the available choices and influenced by the surrounding contextual and psychological constraints. The nature of decision-making has intrigued many academics pursuing perfect decisions. Buchanan and O'Connell (2006: 33) right-fully refer to late organizational theorists, such as Chester Barnard, James March, Herbert Simon, and Henry Mintzberg, who worked to reveal the issues concerning managerial decision-making and concluded that perfect rationality is always inter-fered with and affected by individual values, detected and approved risks, and the overall understanding of human behavior. As decisions can be referred to as out-comes of thoughtful and rational consideration influenced by intuitive and impul-sive behavior, the process of decision-making presents itself as a deliberation of available choices so as to gain the optimal outcome. Buchanan and O'Connell (2006: 41) conclude their discussion of decision-making with Peter Senge's (2006) observation that decision-making requires a holistic approach, as "People cannot afford to choose between reason and intuition" but better choices come from hav-ing all the available information.

4.1.4   Deliberation in participatory decision-making

In an essay about dilemmas, disasters, and deliberative democracy, Carson (2011) introduces her perspective on decision-making, where "good decision-making needs exploration of agreements as much as disagreement. The trick is to find a way to create shared meaning during the process". Carson (2011) talks about the approach used in deliberative democracy, which emphasizes the importance of everyday citizens as a part of decision-making processes. Researchers Setälä et al. (2021) share similar remarks in their scrutiny of the citizen jury process. This ap-proach often appears as an unutilized but critical opportunity to tackle the so-called wicked problems (see Rittel & Webber 1973). Citizens possess vital knowledge and insight, which they are able to bring to deliberations. In delibera-tive processes, the voice of the user functions simultaneously as a resource for de-cisions even as the person to whom that voice belongs is a recipient of the decision outcomes. The original formulation of democracy is found in ancient Greece, circa 500 BCE (Buchanan & O'Connell 2006: 36), where the importance of mutual

decision-making and consideration of choices was organized to pool the wisdom of people in pursuit of acceptable and fair decisions (Carson 2011). The theory of deliberative democracy derives, therefore, from the collaborative decision-making of context-relevant parties. This approach values the insights and user information that the deciding outcomes are meant to serve (Chambers 2003: 316).

Gutmann and Thompson (1997: 38) present the meaning of deliberative democracy as "citizens and officials must justify any demands for collective action by giving reasons that can be accepted by those who are bound by the action". The nature of democracy promotes collective decision-making that seeks to find moral agreement and mutual respect on issues that can be sensitive as well as involving multiple parties and containing potentially conflicting values. Gutman and Thompson (1997) provide four perspectives derived from the deliberative democracy ideal that serve to resolve conflicting decisions in a way that produces collectively accepted sustainable results. The aims are as follows: to promote legitimacy for collective decisions, to encourage broader public interest on common issues, to promote mutually respectful decision-making, and to help detecting and correcting mistakes and obstacles in issues that expect collective evaluation. O'Flynn and Setälä (2022: 904) share this assessment, as they point out how "deliberation is an activity suited to conflicts of judgement", and is a method for pursuing the best decision that can be made in the circumstances.

Deliberative democracy could be described as an approach for making informed public decisions, which incorporates the public view in practical processes that inform people of their given rights and decrease possible democratic deficits (Nabatchi 2010: 384). The participation and deliberation in the processes are the defining characteristics that bring informed and reasoned discussion into democratic decision-making (O'Flynn & Setälä 2022: 899–907; Cohen & Fung 2004: 24; Nabatchi 2010: 384). Deliberation has advantages for solving practical issues, as it helps identify problems through collective engagement, pursues mutual outcomes and enables the testing and evaluation of solutions in their local circumstances by participating experts (Cohen & Fung 2004: 24).

The aim of deliberation relates to the objectives of co-production, or co-creation as it is also known, which seeks to increase users' involvement in the development and creation of service transactions (Munno & Nabatchi 2014: 3). Munno and Nabatchi (2014: 2–3) characterize deliberation with five steps that often appear as an iterative process during deliberative communication and knowledge and information transactions.

1. Deliberation is based on reciprocal dialogue between participants who exchange knowledge, information, and insights during the process.

2. The transaction of knowledge capital enables an identifying, weighing, and prioritizing of the issue-related values that become apparent.

3. Through the communicative process the deliberation produces broad range of opportunities and ideas for functional and creative outcomes.

4. The existence of multi-professional knowledge causes values and facts to collide in ways that produce weighted strengths, weaknesses, opportunities, and threats about the matter being investigated.

5. Ultimately, deliberation aims to result in the best decisions that the given time and enabling resources can provide.

Deliberation and co-creation can be considered closely related, as they function parallel to each other with the aim of achieving the desired outcomes. But as Cohen and Fung (2004: 27–28) state, concentrating on the quality of the discussions might require diminishing the scale of participation in co-creation but can improve the quality of the outcomes that are made by informed and acknowledgeable members. Deliberation seeks to deliver informed results by focusing on the quality of the dialogue by including the necessary expertise. In turn, deliberation might restrict the amount of participation to enable the required space for the focused processing of perspectives. Deliberation depends on the participants having sufficient knowledge, even though the participants' knowledge capital and awareness have the potential to improve during the process. Nevertheless, this constrains broad participation and requires a considered selection of representatives to bring the important aspects and perspectives to the attention of those deciding. Even though deliberation contains restrictions for participation, the integrity of the deliberation acts as the guiding principle for the selection of participants. Regarding the quality of the deliberation, Leino et al. (2022: 431) remind us how experts as participation members can come to distort the direction of the decisions, as they might introduce a shift in power to the conversations.

Rather than authority regulation, deliberation uses a conciliatory approach between the people, the context-related members and stakeholders. Ackerman and Fishkin (2002) introduce deliberation as having the values of information, dialogue, deliberation, and community (see Table 2). These values aim to produce considered judgements about the context-related issues. The discussions take place in heterogenic groups guided by mutual learning, where reasoned arguments are exchanged back and forth to discover new and competing perspectives. In order to avoid misguided or ignorant outcomes, the aspects of deliberation pursue the provision of good information for and by the members, as participants share their knowledge without fear of judgement in order for the collective to gain an

optimal awareness to inform their decision. The values of information, dialogue, deliberation, and community bind together in deliberative processes as they affect and strengthen each other. In the following table each of the values is examined individually but how they overlap is also revealed. Ackerman and Fishkin (2002: 139–148) introduced the values' intertwined nature, showing that it provides a functional insight into the values and practices of the deliberative processes.

Table 2.　　　　Values incorporated in a deliberation day (Ackerman & Fishkin 2002)

Information
• In deliberative processes, each member has the right to participate due to their role and appropriateness to the context. Personal status, coming from their work experience and from life provides a certain expertise for the participant that exists as an appreciated value of knowledge and information for collaboration. Information is thereby an asset that is gathered from the collective during the participants' discussions.
Dialogue
• Dialogue plays an important role in deliberation as reciprocal communication is the area where information, knowledge, opinions, and expertise exchange between participants. The participants act as representatives of the context of knowledge and have professional perspectives. Collective dialogue, which usually takes place in small groups, acts as an opening of new understanding and awareness of contrary perspectives and is an expected outcome of deliberation that liberates discussions to take a holistic approach to the matters under consideration.
Deliberation
• The act of deliberation contains the requirement of reciprocity, which includes an ability to reflect other opinions and new information in a respectful fashion. Deliberation includes the values of interest and appreciation in dialogue; these become apparent by requesting answers that reflect the participants' true opinions and listening so as to relocate oneself to the other person's position. Genuinely encountering people aims to remove any biases and prejudiced attitudes from the interaction, ultimately seeking to resolve on a sensible common ground for sustainable decision-making that leads to the most justified outcome.

Community

- The concept of community in relation to deliberation needs to be understood as broad as the deciding matter influences the people around it. Ackerman and Fishkin demonstrate the community aspect in the context of political election campaigning by the requirement of local and national actors to join forces in to engage in national politics. Broadening the community to be heard in decision-making and development, from the official authority to a broader public, is a way to ensure that the voices of the people are found among the decision process. The broad range of opinions and expertise is gathered into the deliberative process through representatives, ensuring the presence of the important polar opinions.

4.2 The research setting

The research setting consists of the group conversation data from two research and development projects that were organized for the years 2016 and 2017. The Digital Café project was a part of a larger Smart Countryside development project, and it consisted of evening-length events in three rural locations in the Finnish countryside. The Digital Café events were organized during the fall of 2016. The Organizational Jury project was arranged in partnership with the Tampere University Hospital's Children's Psychiatric Clinic, with the aim of developing the clinic's services and processes by engaging with crucial stakeholders in the development process. The Organizational Jury project took place in the spring of 2017. Both projects produced immediate development outcomes for the target groups and organizations as well as secondary research and development data for research purposes. The introduction to the research projects will be introduced in chapters 4.2.1. and 4.2.2 as follows:

- The project's intention

- The project's execution

- Description of the project's process

- The project's outcomes

The author's research position regarding the collected empirical data is multifold, as the author participated in the planning, coordination, execution and finishing of the projects' but carried alone the data analysis presented in the research. The Smart Countryside project's Digital Café -execution was arranged by the Vaasa

university research team. The author worked as project researcher for the project during that period. The project research activity included planning, marketing and executing of the events, as well as involvement in the writing of the Smart Countryside research publication (see Antikainen et al. 2017). The university hospital Organizational Jury -execution was drafted and preplanned in the common conversations between the author and the Children's Psychiatric head nurse Pirjo Rantanen prior to the project execution. The Organizational Jury -project involved the planning and scheduling of the research and development approach, as well as writing of the project report (see Niemi et al. 2017). In both projects, the author engaged as facilitator to the group discussions and co-produced with the team members the recorded group discussions into text form. The management of the Organizational Jury events and coordination of the final development outcomes were also on the author's responsibility. Despite the cooperation during the projects, the dissertation research analysis is solely executed by the author.

4.2.1   The Digital Café

The project's intention.

As digital opportunities and challenges appear as a vast topic that requires insights from multiple perspectives, the Digital Café research and development project existed as part of a much larger endeavor. The Digital Café project was a part of a larger, national-level study called 'Smart Countryside—better services in rural areas by using digitalization and experiments', which focused on the current state of digitalization, its opportunities, international practices, and its users' views on digital services (see Antikainen et al. 2017). The Smart Countryside project was conducted by a consortium of four actors: MDI—Consultancy for Regional Development; Spatia—Center for Regional Research University of Eastern Finland; SYKE—Finnish Environment Institute; and the University of Vaasa Department of Administrative Sciences. The Project was funded by the Finnish Prime Minister's Office, and it was conducted from April to December 2016.

While the whole Smart Countryside project focused on multiple issues related to digitalization in rural areas, the Digital Café focused on users' views, users' perceptions of digitalization, and the opportunities and features related to digital services and solutions. As people have divergent views about and requirements for digital artifacts, solutions and services depending on their needs and desires, the Digital Café events aimed to gather participants broadly from the local regions. The heterogeneity of the participants ensured the appearance of multiple interest points, perspectives, and insights in the collective group discussions about the possibilities and drawbacks of digitalization. In total, the Digital Café project gathered 42

participants of different ages and genders, from diverse educational and occupational backgrounds, who provided differing insights on multiple societal and leisure-related actions.

The Digital Café events were held in three rural Finnish municipalities: in Kauhajoki (part of Southern Ostrobothnia); in Rääkkylä (part of North Karelia); and in Kuhmo (in the Kainuu region). The composition of each Digital Café event is described in detail in Table 3 below. Overall, the events gathered a surprisingly even number of men and women, of various ages, although a majority were elderly. As with age, their occupational backgrounds also appeared broad, including participants at basic employee status to those of expert or management level, as well as students and pensioners.

According to the preliminary information, the participants had a mostly positive attitude toward the use of electronic services. In all locations, most of the participants completely agreed to favor e-services and a small minority agreed to some extent, as the background survey of the opinions and attitudes toward digitalization reflects. The group discussions were conducted amicably, with only minor disagreements or conflicting opinions during the dialogue.

Some of the participants arrived at the events unannounced but everyone was nevertheless welcomed into the discussions. Due to these unannounced arrivals the research group was unable to gather preliminary survey data from every participant, so Table 3 is not able to accurately describe the background information of every participant.

Table 3.   The composition of the Digital Café events

	Kauha-joki	Rääkkylä	Kuhmo	Total
Total no. of participants*	10	19	13	42
Gender				
• Male	4	5	4	13
• Female	6	5	7	18
Age groups				
• 1945–1960	4	4	7	15
• 1961–1980	6	4	3	13
• 1981–1990		2	1	3
Occupation				
• Employee	4	3	1	8
• Entrepreneur		1	4	5
• junior executive	1	1	1	3
• senior executive	1	1	2	4
• Retired	1	3	2	6
• Student	1			1

• Unemployed			1	1
• Other	2	1		3
My attitude toward e-services is positive				
• Fully agree	8	9	7	24
• Somewhat agree	2	1	4	7
• Neutral				
• Somewhat disagree				
• Fully disagree				

*In some instances, the research group was unable to collect the preliminary survey from every participant.

The project's execution

In each location, the events were organized to occur in the late afternoon / early evening, from 16.30 to 20.15, with the main focus being on the group discussions between the participants. In the Digital Café events, the participating members (see table 3) were divided into two smaller groups of 4 to 10 people after the initial presentations. The schedule enabled almost two hours for the group discussions, which were recorded for research and development purposes. In addition to the discussions, the participants were provided with information about the Smart Countryside research and development project, about the course of the event, and with a motivating presentation about the opportunities, advantages and features of digital transformation.

The aim of the presentation, as with the whole event, was to provide the participants with sufficient information about the topic of digitalization, so that the participants would feel informed about the content and able to imagine digital possibilities to serve their needs. The information aspect was fulfilled by the provided presentation but also through the collective learning between the participants during the group discussions. During the group dialogue, the arguments put forward had to be explained and justified with understandable reasoning, in the deliberative democracy fashion (see Munno & Nabatchi 2014). The guidelines for a respectful and equal dialogue with justified reasoning were enforced by two objective facilitators within each group. The facilitating principles that functioned to ensure the quality of the dialogue were presented to the participants at the start of the event and are itemized in Table 4.

Table 4.   The principles of quality dialogue (Brown & Isaacs 2001: 3-4).

1.	Create a hospitable space. Ensure a warm and friendly environment for the meeting. This hospitable space aims to provide a safe surrounding for everyone to share their ideas and opinions without feeling pressure or tension from other group members.
2.	Explore questions that matter. The quest for meaningful conversation, innovations and insights begins from compelling questions that direct the dialogue toward deep considerations of the content. Along with directing the discussion topics to deeper levels, the questions also keep the conversation within the bounds of the themes of a chosen topic.
3.	Connect diverse people and perspectives. Make space for growing knowledge and intelligence: a multitude of actors bring variety of knowledge and perspectives to the conversation, which enriches the ongoing dialogue. The knowledge and expertise of participating people collide in the iteratively progressing discussion cycle.
4.	Listen together for patterns, insights, and deeper questions. The emphasis of this principle lies on the meaning of shared listening that enables the discovery of new connections between different perspectives. Listening requires allowing space for open discourse that values multiple perspectives, and conversational openness to reflect different aspects of knowledge and expertise enables the discovering of nexuses between features.
5.	Make collective knowledge visible to the group. Visualizing or otherwise illustrating the achieved discussion outcomes provides a shape and texture for the knowledge to be more easily reflected and returned again and again. Making the newly crafted knowledge visible enables it to be presented for a new audience, but it also seals participants' mutual perceptions of the achieved outcomes.

The utilized discussion principles were taken from the principles of World Café, a method introduced by Brown & Isaacs (2001), which guides quality discussion that recognizes the emergence of new knowledge and insights rising from the mutual learning and exchange of thoughts. These also appear as values in the participatory-deliberative processes (see Joshi & Brattetteig 2016; Bødker & Halskov 2012; Kyng 1991). The presented principles acted as guiding thoughts for the discussions,

but also as a guideline for the groups' facilitators who were ensuring the quality of the discussion and securing a friendly environment for participation. This allowed the ideals of participatory design to be realized in the ways introduced by Greenbaum and Kyng (1991) (see chapter 4.2). Simultaneously, the guidelines of participatory design (see Pedersen 2016; Joshi & Bratteteig 2016) as well as deliberative democracy (see Gutmann & Thompson 1997) facilitated the fostering of a friendly atmosphere. The participants acted as the main informants of the event, thus providing their valued opinions and ideas based on their subjective needs, wants and fears for future development. Therefore, the content of the discussions was not in any way restricted by the organizer; rather, the participants were allowed all the creative and imaginary freedom needed for idea creation. During the process, the participants acted as the source of insights, bringing their perspectives to creating ideas and solutions for development, as Bødker and Halskov (2012: 149) described when laying out the premise for a good design. The discussions' themes varied from education, to work and business topics and to the broad range of topics dealing with leisure activities in the aspects of health and wellbeing, safety, and entertainment.

The dialogue-based World Café method presented by Brown and Isaacs (2001) was strengthened with deliberation principles that specifically value the discussion quality, reflection of the expressed insights, and consideration of alternative opinions and information. Differentiation between dialogue and deliberation was ensured by presenting the deliberation-based guidelines as good conversation practice to the participants before the group discussions. During the process, the quality of the deliberaion was guided by the objective group facilitator. The World Café method has been utilized as a deliberative democracy approach and categorized as deliberative mini-publics (see Grönlund et al. 2014). Puustinen, Raisio and Valtonen (2020) highlight the use of the World Café method with deliberative principles, as the researchers also explain how they have taken the approach even further by involving expert witnesses to the process as informants who are present during the process.

Prior to the events, marketing was carried out through direct marketing on social media (Facebook) and via emails, but also by calling local organizations, associations, businesses, and community members. Printed Digital Café advertisements were distributed around the region and the events were advertised on radio and in a local newspaper prior to the date. The events were organized in collaboration with some local associations and developmental organizations (regional Leadergroups), which helped enormously by spreading the information to their networks. The advertising aimed to attract as broad and heterogenic a group of audiences as possible, while still maintaining the participants' relevance to the context. These

issues were emphasized within the participatory-deliberative design from both the participatory design and deliberative democracy perspectives (see Chapter 4.1).

Description of the process

During the Digital Café events, the participants focused on considering ways digitalization could be utilized in their area and what kind of opportunities, threats and challenges it contains. The working aim was for people to express their thoughts, ideas and insights concerning the use of digital artifacts, solutions, and services, in their region and as they personally saw fit. Individuals' subjective needs and desires would then collide with others' opinions and thoughts within the group, resulting in mutually respected decisions and legitimacy for the outcomes (see Gutmann and Thompson 1997 and Vines et al. 2013). In this collective fashion, the Digital Café events produced developmental solutions and notions arising from people's subjective points of view, but the ideas were also strengthened and evaluated in the reciprocal dialogue within the group. The conversations progressed in an iterative fashion, as the topics of discussion were viewed from multiple perspectives and debated back and forth. The iteration covered most of the steps of the participatory design process, as found in figure 13, from Joshi & Bratteteig (2016: 3). Only the test and evaluate phase was left out, as the process did not include clinical practices.

During the conversations, the research group facilitators, along with ensuring the deliberation principles, also helped the groups to capture their developmental ideas by taking notes of the ongoing discussion and guiding the conversation to complete the unfinished suggestions and notions. The discussion ideas and topics came purely from the participants' perspective and the ideas that got the most attention and achieved the whole group's acceptance were written down as group outcomes. By involving the principles of deliberation day from Ackerman and Fishkin (see Table 2), the comprehensiveness of the perspectives was made available during the process. With mutual agreement, each group ended up with four to six developmental suggestions for the utilization of the ongoing digital transformation (see Antikainen et al. 2017). During the events, each of the participants got to express their opinions and thoughts as the group formed their mutual understanding of the valued topics. Thus, the final suggestions represent the user-perspective-driven valued choices. The duration of the events resulted in being one of the forces restricting progress. That said, the duration of three-and-a-half hours for one session was also noticed to be very functional for a one-time meeting.

The Digital Café project managed to bring together people for collective discussion and development of digital artifacts, solutions, and services from the users' perspective. Considering all the events together, the nature of the discussions can be

said to have flowed with a good level of interest and enthusiasm, and all the discussions happened among well-behaved, good-spirited people. The conversations contained mutual agreements, disagreements, different perspectives, and divergent views and information from the participants that formed the groups' collective knowledge; this can be seen in the findings presented in Chapter 5.

The project's outcomes

The Digital Café project provided the group outcomes to the participating members for further development to utilize their input as much as possible. For research purposes, the groups' outcomes (see Antikainen et al. 2017) act as a supporting framework for analysis. Within the content analysis, each suggestion is viewed in detail to capture the essence of the user's perception of digitalization. The developmental suggestions from the group discussions function as the guiding source for the research analysis. Along with reading and listening, the full conversations and the developmental ideas and suggestions help to form the required preliminary understanding of the content before the thorough content analysis (see Chapter 5). The research analysis is performed by exploring the discussions from the six separate groups. The group discussions were separately recorded, transcribed by the research group members and analyzed by the author. Discussion notes were drafted during the conversations to support the forming of the development suggestions. The notes were also used as supportive material for the data analysis.

The Digital Café events provided all together 11 hours of small group discussions that resulted in 191 A4 pages of transcribed text (in single-spaced, size 12 Times New Roman format) for the research content analysis (see Chapter 4.4). The groups' suggestions represent direct phrases from the group members and as such present the issues as the participants wanted to express them. For research purposes, the groups' developmental ideas and suggestions were further translated from Finnish to English. Within the analysis process, the anonymity of the participants is protected by coding the conversation as follows: location, group, participant (resulting in alphanumeric designations like L2G1P4).

Permission to record for research purposes was requested from the participants at the beginning of each session. The research data was secured and placed solely in the possession of the Digital Café research group.

4.2.2   The Organizational Jury

The project's intention

Tampere university hospital had announced a large-scale development strategy that concerned most of its clinics. The reformative program began in 2010 and the execution was planned for the year 2020. The future reform contained newly built facilities for many of the hospital clinics as well as revised operating structures for the newly built working environment. The development aims were targeted to respond to the growing demand for health care services and to provide a customer-oriented approach for more efficient and better health service delivery. The development strategy acted as an initiating force for the development of the Children's Psychiatric Clinic, which was then approached using the Organizational Jury method. The discussion of the Tampere University Hospital's Children's Psychiatric Clinic's developmental work began with the clinic's head nurse, Pirjo Rantanen, who was already aware of and intrigued by the participatory development processes that the Vaasa University Social and Health Management unit's team of researchers have been undertaking.

Vaasa University's Social and Health Management unit has a history of working with the theory of deliberative democracy to deal with complex questions and value-charged topics. In 2013, Vaasa University researchers organized a pilot organizational jury scheme in partnership with the Vaasa Central Hospital oncology clinic (see Jekunen, Vartiainen, Raisio, Lindell & Niemi 2013). Deliberative decision-making in an organizational environment justifies the transition from the citizen jury method to the organizational jury method (see Lindell 2017). The organizational jury development method builds on the theory of deliberative democracy by having the multitude of organizational actors participate, in miniature form, in collective decision-making about the organizational planning processes and future decisions. The heterogenic group of actors therefore represents all the professions, expertise, knowledge, and decision-making power that the organization possesses in its operations (Värttö 2019: 794–797; Lindell 2017: 54–60).

The partnership between Tampere University Hospital's Children's Psychiatric Clinic and Vaasa University's Social and Health Management unit's research team started the development project on mutual grounds by agreeing to the participatory development approach. This act immediately promoted the legitimacy of the forthcoming process, as found by Gutman and Thompson (1997). The author acted as the responsible coordinator from the university research team and head nurse Rantanen acted as the operating person from the hospital clinic's perspective. The participatory members of the development process would then be gathered from the clinic's employees, customers, and related stakeholders to form the

organization in miniature form. This broad participation ensured the inclusion of all the critical expertise and knowledge needed to reveal the development aspects critical for collective planning and decision-making. The project duties were divided so that the author was primary in charge of the project methodological planning and execution. Head nurse Rantanen participated in the project planning and carried out the practicalities regarding the execution of the events.

The project's execution

The working method for the Children's Psychiatric Clinic's Organizational Jury was organized by both partners. The framework for the execution was mainly planned by the author while the on-location responsibilities were organized by head nurse Rantanen and executed by the members of the hospital clinic. After separate planning activities, the execution was confirmed in mutual discussions between the organizing parties. The project's execution needed careful scheduling because it required a significant presence from multiple employees vital for the clinic's daily operations and matching the children's parents' timetables to the project sessions. In total, 16 people participated, from both the clinic's personnel and the children's caregivers. After all the dates were successfully crosschecked with the clinic's operations and with employees' shifts, the Tays Child Psychiatry Organizational Jury was held in the spring of 2017, from 16th of March to 6th of April. A functioning co-creation relationship between the organizations was a critical factor for the success of the execution. Head nurse Rantanen was essential to the process and pivotal in involving the users to the design process, as Yalman and Guclu Yavuzcan (2015: 2245) theorized regarding the PD process.

Since the hospital environment and especially children's issues were at stake, the hospital district demanded approval from the hospital ethical committee for the project to go ahead. This was decided before anything else, and allowed the development project to move forward. To protect the children's care and to honor their privacy, the children, as customers of the clinic, did not engage in the project discussions but their voices were represented by their parents and caregivers. This was a necessary compromise to gain the broad involvement of valued perspectives, as the participatory-deliberative design requires (see chapter 4.1). The development project's focus was on the organizational processes and the planning of future service delivery. As organizational development was the primary concern, the conversations were not guided or aimed toward the medical treatments or operations. The medical issues were only addressed indirectly during the deliberation, if the participants found them relevant to the organizational processes or services. The execution of the Organizational Jury process happened in three stages (see Table 5). Each step prepared and aimed to create collectively formed development

ideas and execution suggestions, as the process focused on sharing information and knowledge to build ideas in the iteration of knowledge formed via mutual co-creation (see Figure 13).

Table 5. The Organizational Jury process: execution and scheduling

Stage	Time frame	Description
1.	16:30–19.15 - 16:30–18:00 Introduction and presentations - 18:00–19:15 Group conversations and closing arguments	• the first stage included the educational aspect of the process by providing content-related information and motivational presentations for the participants. The information was provided by the research group members as well as an external professional. • At the first meeting, the participants started idea creation for organizational development
2.	16:30–19:00 - Participatory group dialogue	• The second stage consists of reciprocal dialogue between group members, aiming to share knowledge, information, and expertise between the members but also to engage the participants in mutual learning. • The deliberative group interaction represents an essential factor for the process and was thus given extra attention to enhance the quality and duration of the conversations.
3.	16:30–19:00 - Participatory group dialog and collective forming of the final reform plan.	• The third stage represents the final forming of development suggestions. At this final stage, all the members engage in a collective activity in which all the ideas and results of the development process are combined to create a mutually accepted reform plan. • The collective activity of finalizing the reform plan required an extra meeting that was agreed and scheduled during the third meeting.
• An online discussion platform was provided for the participants to share the ideas and the content of the group discussions but also to support the continuance of the dialogue outside the events.		

Supporting information, motivational speeches and an introduction to the overall process were provided in the first stage of the Organizational Jury. An outsourced speaker provided the audience with an insight into the hospital technology opportunities. Research group members introduced the participants to the topic of tackling work-related complex issues, as well as to the topic of working together in a participatory and deliberative fashion. The informing step of the process raised awareness about different perspectives on the context, enabling justified and quality deliberation about the matters, as can be found from the values incorporated in a deliberation day (shown in Table 2). After the presentations, the activity sections and timeframe were introduced to the participating members. The schedule prioritized the group discussions, which were targeted to reveal the user approach to and perception of the organizational development issues. Within the development process, the participants were enabled to express their opinions, needs and desires without restrictions. An informal topic structure was provided in advance to target the discussion on:

- Change management

- Technological opportunities

- The multidimensionality of interactions

The group discussions were hosted by facilitators from the university research group, who worked to secure good conversational flow by raising questions and guiding the dialogue in order to make everyone's voice heard (see Ackerman & Fishkin 2002, Table 2). The facilitators obtained an objective view on the discussed issues and sought to raise every relevant perspective on the topics. During the conversations, the facilitators also listed the created ideas along with a description of them. To gain more thorough insights later, all the project's group discussions were separately recorded. After each session, the groups' discussions were collated and sent electronically to the participants as inspiration for the next development meeting. The process ensured and promoted the iteration of the created ideas and exchanged opinions and information, in keeping with the principles of participatory-deliberative design (see Chapter 4.1; Joshi & Bratteteig 2016; Munno & Nabatchi 2014).

The Children's Psychiatric Clinic Organizational Jury had four sessions, which all occurred roughly a week after each other. Each meeting lasted around three hours, starting at half past four in the afternoon. The scheduling allowed the employees to have their morning shift or a free day and enabled parents to participate after finishing work. The first session was about providing the participants adequate information about the project, the topics, and the option to get to know each other

and start the discussions. The second session was about idea creation in group discussions. Between the first and second sessions, the groups were separated to provide a changing group dynamic and to spread the ideas from one group to another. The aim of the third session was to gather the ideas and suggestions and finalize the project outcome. During the third session, it was decided to organize an extra (fourth) session as the collective finishing of the work required more time than anticipated.

Between meetings, the participants were informed about the whole group's outcomes (as described above) but they were also provided the opportunity to continue their conversation and crafting of ideas on an online eDelfoi platform, www.edelfoi.fi (later www.edelphi.org). During the project, the online discussion platform was not used by the participants and thus did not provide any meaningful extra input for the project. Nevertheless, the eDelphi online platform was kept available for the duration of the project even if it proved to be unsuccessful in facilitating further discussion.

Description of the process

The group discussion sessions enabled a shared stage for multiple insights, opinions, and values, as the meetings gathered the clinic's professionals—whether doctors, nurses, secretaries, cleaning personnel, psychologists or other experts—into discussions in which the patients' parents were able to express their valuable perspectives on care, customer service and service delivery. The presence of multiple actors demonstrates the importance of each view. One of the key principles for the discussions was that everyone's voice needed to be heard and treated equally in order to bring out all the important views and approaches for holistic development. In this fashion, the Organizational Jury offered a unique opportunity for all the participants to meet in the same discussions. The comprehensive participation, together with the democracy guaranteed within the groups, ensured the quality of the discussions (Leino et al. 2022; Munno & Nabatchi 2014; Cohen & Fung 2004), and, as the fundamentals of the participatory design state (Figure 12),

> *"People who are affected by a decision should have an opportunity to influence it."*

The enthusiasm for and interest in participation became apparent during the group discussion, during which the members presented the admirable qualities of honoring other's opinions, understanding each other's perspectives, and showed considerate qualities in their dialogue and exchange of information, knowledge, and expertise. They generated an atmosphere that promoted the deliberative aims of legitimacy and informed decision choices, as Gutmann and Thompson (1997:

38) advocated. Participating members' professional backgrounds in psychiatric care could be considered as providing the participants with the advantage of understanding and acknowledging the meaning of listening and discussion.

To support a pleasant and comfortable atmosphere for the event session, the organizers held the meeting in comfortable surroundings where the participants were not disturbed or interrupted by any external stimulations. Each of the groups met in separate spaces and were provided with refreshments for their comfort. The discussions were hosted by external facilitators from the researcher group, who guided the discussions by keeping them flowing in a comfortable manner and providing space for the participants to get to know each other. Differing opinions were encouraged, as was making space for dialogue for all, which meant encouraging the participants to share their opinions. The free expression of opinions enabled the collision of the divergent and convergent thinking processes that support the creative design process, as explained in Chapter 4.1. Participants were also requested to justify and explain their arguments, so that their views would become clear to all. Each of these discussion guidelines were introduced to the participants in advance, in order to avoid any confusion or offense during the sessions.

The development topics revolved around the function and operation of the clinic, and its daily operations and services. As was the case with previously described projects, the discussion topics were not restricted in any way within the Organizational Jury project. However, in order to provide some structure and a starting point for the conversations, the developmental approaches of change management, technological possibilities and the multidimensionality of interaction were used as conversation openings.

Initially, the technological dimension was expected to cover some parts of the discussions and developmental suggestions, depending on the flow of the conversations. But as the nature of technology, and digital technology in particular, is inextricably intertwined with multiple other topics, the technological approach came up as natural, organic topic and dimension of organizational and service development (see Parviainen et al. 2017; Earley 2014). This research will focus only on the thoughts and ideas utilizing the technological perspective; the other developmental approaches will not be addressed in this research.

The project's outcomes

During the process the members offered multiple suggestions and fresh ideas for improving the clinic's functionality. The ideas came from all the participating members' perspective and addressed issues concerning the operations inside the clinic and the service features reaching the customer interface. All the information

was shared for everyone's consideration and during meetings the ideas were refined in detail. Between the groups, the overlapping discussions were interconnected in the last stages of the development as the organizational jury started forming the overall operation plan. The outcome was 12 suggestions (see Niemi, Lindell, Aho & Rantanen 2017), ranging from improving the customer orientation of services to the comfort and functionality of the work facilities.

Part of the process was that the group should visualize, plan or draft ideas on how the suggestions would be introduced and implemented in the ongoing work. This is where the aim of a good design excels as the target, bringing together the ideas from the user's perspective and the appropriate tools from the technology to improve work and life surroundings (Bødker & Halskov 2012: 149). In this way the process itself indicates how the development will continue after the project. The reform plan was introduced to the head of the clinic, whose acceptance of user-based development work had been gained already in order to legitimize the process (see Gutmann & Thompson 1997). Management-level support was requested in order to get advance approval for the process but also to gain support and the motivational push for collaborative idea creation. After the project, a broader briefing about the organizational development project was organized for the whole hospital staff and for the press.

In their sessions, the organizational jury managed to gather and combine information, thoughts, and opinions from diverse perspectives to create mutual goals for the Children's Psychiatric Clinic's future. The reform plan briefly expressed those ideas and the personnel were tasked with continuing refining each discovery and finding ways for each topic to be integrated into the clinic's processes. After the initial process, the work continued among the clinic's personnel to establish the ideas and to include the testing and evaluating phase of the participatory process (see Joshi and Bratteteig 2016; see also Figure 12). The research data consists of these group discussions and the reform plan. The reform plan provides a preliminary starting point for the research analysis by providing an overall insight into the discussed matters (see Niemi et al. 2017).

The organizational jury succeeded in having approximately eleven hours of group discussions, which happened mostly in three separate small groups and involved all the participants, as the members refined and drafted the overall project outcome. The recorded research data were transcribed to text format after the project for content analysis. The written data consists of 319 A4 pages of size 12, Times New Roman, single-spaced text. The research data contains all the discussions from each session and from each small group. In the analysis process the anonymity of the participants is protected by coding the conversation as follows: day, group

and participant, for example D2G1P4. The last two days of the organizational jury focused on collective agreement about the development suggestions, and since this occurred among the whole group, the discussion participants are referred to with a day and participant abbreviation, e.g., D3P5.

4.3   The qualitative abductive research content analysis

Content analysis can be defined as a method that attempts to approach the studied content objectively and form a descriptive view of the research topic. Kyngäs, Elo, Pölkki, Kääriäinen and Kanste (2011: 139) add that content analysis is often used as an analysis approach in qualitative research and in the analysis of open-ended questions of quantitative research. Hsieh and Shannon (2005) agree with Kyngäs et al. (2011) and add that content analysis can be viewed as using three distinct approaches: conventional, directed, or summative. The main aim of the content analysis lies in the goal to "provide knowledge and understanding of the phenomenon under study" (Downe-Wamboldt 1992: 314). Conventional content analysis of this research shows that the text data can originate from different forms of information (e.g., verbal, print, or electronic forms) and be sourced from narrative responses, interviews, focus groups or observations as well as from open-ended survey questions. However, the process of content analysis progresses beyond the measurable explicit knowledge to find the different meanings behind expressions (Hshieh & Shannon 2015: 1278–1280). Qualitative research methodologies usually aim to produce descriptive information about the research content, requiring a multidimensional interpretation of the expressions. The content analysis method supports finding these truths with its analysis approaches (Kyngäs et al. 2011: 146).

The conventional content analysis approach is appropriate when the research is intended to describe a phenomenon, as in this study in which the participants define the utilization of digitalization from their individual perspectives. The content analysis approach allows the categorizing and coding of data as insights emerge from it. This approach is suitable when facilitated by the research data, as it is for inductive and abductive (at least in part) research methodologies (Hsieh & Shannon 2005: 1279) Before continuing to the dimensions of the content analysis process, it is worth examining the differences in inductive, deductive, and abductive reasoning.

Inductive, deductive, and abductive research methodologies vary in how they approach and utilize the research data. The inductive approach represents data-driven content analysis, where the interpretation builds from the data toward a theoretical understanding. The nature of inductive reasoning causes it to appear

suitable for solutions when the theoretical perspective requires or deserves strengthening, as Elo and Kyngäs (2008: 109) argue. Yet inductive reasoning has its weaknesses, as people can end up creating representations based on their existing mental models as opposed to using the knowledge features arising from the data (Graneheim, Lindgren & Lundman 2017: 30).

Deductive reasoning appears as inductive reasoning's opposite counterpart: its understanding is formed on the basis of existing theoretical perspectives. The deductive approach views the studied phenomenon from a theory perspective that takes the interpretation from a general theory perspective in a more concrete and specific direction (Graneheim et al. 2017: 30). This makes the deductive approach suitable for situations where the theoretical approach is being tested in a new context, or where new categories, concepts, models, or hypotheses are being tested, as Elo and Kyngäs (2008: 30) suggest.

The abductive approach—otherwise called complementary, combined, or retroductive by researchers such as Graneheim et al. (2017: 31)—appears as a method where the researcher moves between the inductive and deductive approaches, as the name suggests. Kovács and Spens (2005: 136–137) describe the abductive approach as a breaking out from the constraints of deduction and induction to develop new knowledge, which is encouraged by creativity or intuition within research. Abductive reasoning enables a flow between the inductive and deductive approaches, where the analyzed content is sequentially reflected based on the inductive and deductive approaches, as Tölli, Kontio, Partanen and Häggman-Laitila (2020: 695–696) demonstrate. Graneheim et al. (2017: 31) agree, as they suggest that abductive reasoning can lead to a complete understanding of the content being considered, which enables a phenomenon to be viewed in a new contextual framework, as Kovacs and Spens (2005: 138) suggest.

4.4   The analysis process and framework

Notes for the reader

The research data consists of the previously mentioned Digital Café and Organizational Jury research and development projects' group discussions and development ideas, which were formed in dialogue between projects' context-related participants. Oral permission for data gathering was gained in each case from the participants and they were informed about the research-focused data gathering prior to the project events. In the data analyzing phase, the focus was centered on the insights, ideas and suggestions concerning digital technology and digitalization. To facilitate unrestricted idea creation, the participants were given flexibility and

freedom during the discussions to suggest ideas from any area that came to mind, but only the digital technology -focused insights will be considered in the current research. The anonymity of the participating members is guaranteed throughout the research and each participant's identity is hidden behind a coded identifier. During the analysis the participants were treated as anonymous. Their recognizable background information might be used for the findings and reflections if appropriate, but their identity cannot be recognized from the analysis process. The participants are coded numerically to hide their identity, but identification of the discourse is enabled to form an understanding of the flow of the conversation.

The research project's discussions were held in Finnish and translated into English during the analysis process. As the direct quotations are translated from Finnish to English the expressions were transcribed carefully to match the original meaning, but a certain level of freedom is granted so that the content would transmit the intended rather than literal meaning.

The analysis process and framework

The research data represents the group discussions as they happened in the two projects, Digital Café and Organizational Jury. Following the project events, the recordings were transcribed to text format for in-depth content analysis of the perceptions of digital transformation and the utilization of digital opportunities. As the Digital Café events concentrated on the topic of user perception of digitalization and the utilization of the digital transformation, the project's empirical data represents the main source of research data. The Organizational Jury project focused on three topics associated with the development, which were change management, technological opportunities, and the multidimensionality of interaction. As the Organizational Jury focused only partly on the perception of digitalization and its affordances, only the applicable parts of its data will be utilized for the research. Thus, the Organizational Jury data functions in a supporting role in the analysis.

The analysis process was organized to discover the participants' perceptions of digitalization and their insights for its use, from an empirical point of view. The theoretical framework (see Figure 2) provides an understanding about the digital medium and a way to view the phenomenon from the user perspective. Within the framework the theory of affordances is permitting the discovery of the digitally enabled affordances. The empirical analysis process began in a theory- guided manner by structuring the target categories for the empirical findings.

The theoretical framework and the affordance theory approach guided the mental structuring of the empirical findings, so that the analysis framework main

categories of the digital medium, the perception of the digitalization and the digitalization of artifacts, solutions, and services were formed. The main categories reflect the theoretical framework elements and the affordance theory perspectives as in, how is the phenomenon perceived from the perspective of the digitalization as an entity and its appearance related to the surrounding, from the perception of the observer who is forming the insights, and from the perspective of the artifacts and their affordances. In the interaction of the empirical data and the theoretical framework the theory-guided preliminary structuring of the analysis categories guided the way to the final analysis framework. In the latter stage of analysis process the included elements were refined and complemented by the insights that emerged as empirical findings and the structure got formed to its final appearance in an iterative fashion. The structure of the analysis framework was adjusted throughout the analysis process (see Table 7). The following categories evolved to represent the final structure of the findings (Table 6).

Table 6. Analysis framework

Main categories	Sub-categories
The digital medium	- Ubiquitous digitalization - What is digitalization? - The development aspect of digitalization - Requirements for the digital transformation - Restrictions of digitalization
The perception of digitalization: the self, the surroundings, and the digital artifacts	- The point of observation - How digital transformation fits the environment - The appearance of digitalization - Expectations and lifestyle - Changing habits - The usability and functionality aspects of digitalization
The digitalization of artifacts, services, and solutions	- The spectrum of ideas - The impact on work - Study and education - Smart technology - Health care and wellbeing - Travel and tourism - The digital ecosystem

From the described preliminary structuring, that enabled to collate and categorize the findings the analysis process continued in an abductive research manner to form the further understanding of the empirical data. The research process was arranged to view the theory and the empirical findings in a reciprocal dialogue (see for example Jalonen et al. [2021: 804] and Jalonen and Kokkola's [2020: 307] approach to abductive reasoning [Figure 14]).
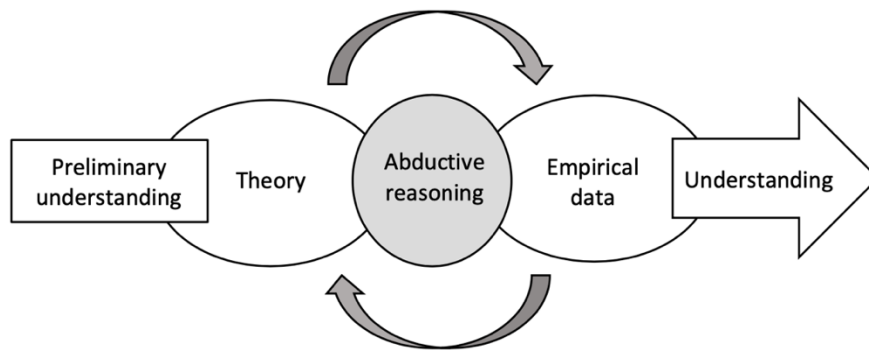
Figure 14. Abductive reasoning and the research process (following Jalonen et al. 2021: 804)

With the target being understanding the users' perceptions of digitalization and its utilization, the analysis process advanced toward the final structuring of the findings (Table 6) in a five-stage process. A sixth stage was organized for analyzing additional research data from the Organizational Jury execution. The analysis process used the abductive reasoning technique (see Jalonen et al. 2021: 803–806; Tölli et al. 2020: 695–696; Graneheim et al. 2017: 31; Kovács & Spens 2005: 136–137). Taking an example from Rossi and Tuurnas (2019: 7–10), the analysis process can be represented as a multilevel circle (Figure 15) similar to that illustrated by Rossi and Tuurnas (2019: 9).

Structuring first-level categories (theory-guided)

Generating second-level categories (data-driven, theory-guided)

Forming third-level categories by summarizing similar passages (data-driven)

Paraphrasing passages (data-driven)

Finding meaningful passages (data-driven)
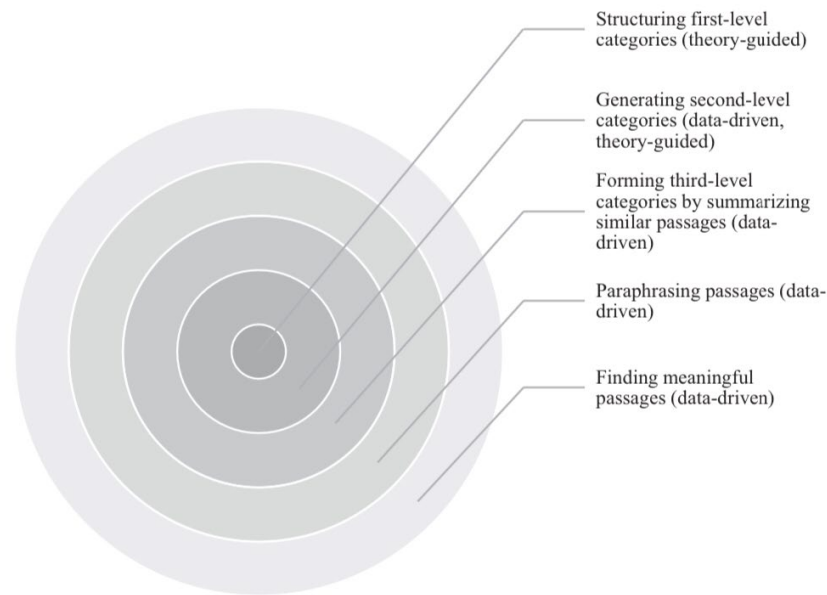
Figure 15. Bottom-up coding scheme for analyzing the data (Rossi & Tuurnas 2019: 9)

The analysis process (Table 7). resembles a bottom-up approach to the knowledge creation moving from a general description to a specific in the analyzing of the data. In the present study the analysis was formed in five stages and the sixth stage of the analysis represents the analysis of the complementary research data from the Organizational jury, that is merged to the overall findings. The theoretical framework (see Figure 2) and the affordance theory produced the preliminary guidelines for the analysis process and the research framework supported the initial target of the study, as the digital medium gave an insight to the digital environment and its opportunities as well as challenges.

Table 7. The research analysis process

Stage 1	• The empirical group conversations were transcribed to text format (see Chapters 4.2.1. and 4.2.2), which provided the preliminary understanding of the content in relation to the theoretical approach.
Stage 2	• All the data was read in order to form insights about the content and highlight the key findings in a data-driven and theory-guided manner.

Stage 3	• The key findings were selected and grouped in a data-driven metho to gain a structured approach
Stage 4	• The group findings were merged according to similarity and the results were divided into sub-categories. The sub-categories were created in a reciprocal interaction between the theoretical framework and the empirical data, in a data-driven and theory-guided manner.
Stage 5	• The categorized findings were merged with the theory-driven main categories.
Stage 6	• The main empirical data from the Digital Café was supported and strengthened with the empirical data from the Organizational Jury project. • The Organizational Jury conversations were processed similarly to the Digital Café data according to the stages of the analysis process above. Together they comprised the overall findings.

The analysis process executes the interaction that the relationship between the research framework's concepts (Figure 2) includes. The affordance perspective contains the element of the user-centered approach to digital affordances. Co-creation provides a methodological means for digital insights, as the participants draw ideas from the digital medium. In the abductive research approach, the empirical analysis involves the theoretical perspectives interacting with the empirical findings. Chapter 5 of this research represents the empirical findings and addresses the users' perspectives on the potential and inhibiting factors of the digital medium. Together, the research findings and the theoretical perspective provide the research contribution presented in Chapter 6.

5   FINDINGS

The Digital Café and the Organizational Jury group conversations provided much user-centered insight on the digital medium as well as on the perceptions and insights relating to the potential and risks of digital development whether the context is the area of regional services and the development of the work and leisure environments, or within an organizational domain and focusing on the processes and services. The findings are collated from the two projects within the same analysis framework structure to provide a holistic view of peoples' insights into the digitalizing surroundings. Collating the projects' findings strengthens the individual projects and the overall outcome of the study. As stated in Chapter 4.4, the Digital Café conversations were analyzed first and the Organizational Jury process second, supporting the already-discovered findings and providing insights on new perspectives.

The findings are written as a dialogue between the empirical findings and the supporting statements made from the theoretical perspective. The intention is to provide an intriguing conversation about the context in a reciprocal manner, where at times the empirical findings challenge the theoretical perspectives and sometimes the theory is found to support the empirical insights. The outcome indicates a clarifying understanding about the content, when different knowledge and perceptions are collated from multiple sources and reflected with iterative manner. The approach reflects the philosophical approach that the hermenutic circle explains (see Chapter 1.3). As the participants provided their broad perspectives on the matter in the two projects, the analysis elaborates an extensive number of topics. Due to the rich content, the findings can be viewed in two sections. The first (Chapters 5.1 and 5.2) explores the meaning of the digital medium and the perceptions revolving around it. The second (Chapter 5.3) focuses on the more tangible elements of the digitalization, focusing on the specific target areas and their surroundings.

After the findings, Chapter 6, the conclusions and discussion, gathers the insights to provide an answer to the research questions. As the findings represent the users' perspectives on digitalization prior to the global COVID-19 pandemic, which changed the lives of and the pace of digital transformation for most people, organizations, and societies (see Forman et al. 2020), it is interesting the review the insights in light of current events, as Chapter 6 will undertake.

The Digital Café insights are represented with the abbreviation 'DC' in front of the direct quotes, while the abbreviation 'OJ' is used for the Organizational Jury comments.

5.1   The digital medium

The participants thought and opined broadly around the topic, considering how to make use of digital possibilities, what kind of challenges and restrictive features they include, and how the digital transformation can best serve the people and the area. The discussions went in various directions but were threaded with the common theme of how to utilize digitalization for peoples' benefit in their familiar surroundings. Overall, the discussions formed the users' subjective views of the phenomenon of digitalization and its use.

As is known theoretically, the nature of technology is experienced subjectively. The constant appearance of novel solutions and changing artifacts, along with modifications within the existing functionalities, introduces the requirement of updating and learning, which appears differently to each user (Norman 2013: 32–36). The empirical findings reveal that nature of endless possibilities and subjectively perceived needs, along with the interconnectedness of all things digital, as Ritter et al. (2014: 43) claimed. The theory as well as the empirical data reveal how the opportunities, restrictions and wishes of digital transformation carry unique features that define the success of digital creations. The individual perceptions based on people's interests and aims, about social interactions, education, entertainment, work, and life in general, represent the social side of the system that needs to be included in the ecosystem, as Ritter et al. (2014), Norman (2013) and Mumford (2006) explain when describing the ethos of a functioning socio-technical system (see Chapter 2.6.3).

The analysis shows how people perceive the spread of digital transformation. The opinions, attitudes and insights are formed from each participant observing the offerings and requirements of the digital medium. The analysis approached the topic with abductive reasoning, where the group discussions led the flow of the content and the theoretical perspectives were found to support and fulfill the analysis. In this manner the analysis of the digital medium led to the structure of the following subchapters:

- Ubiquitous digitalization
- What is digitalization?
- The developmental aspect of digitalization
- The requirements for digital transformation
- The restrictions of digitalization

The findings are collated from the Digital Café (DC) and Organizational Jury (OJ), but the context will reveal the origins of the information. The abbreviations of DC and OJ are used in the text to support the readability of the content.

5.1.1   Ubiquitous digitalization

"What does digitalization mean" was the leading question related to the empirical discussions, and for a good reason since the question involves accurately identifying and assessing the underlying mystery of the digital transformation and how it has different meanings for different people. As Zammuto et al. (2007) and Rodden (2008) make clear, digital technology artifacts, software solutions and networks have become ubiquitous around us, but the technological dimensions are still experienced quite differently from one person to another. The participants came from different professional, educational and demographic backgrounds but all the attendees of the Digital Café events shared an interest in technological change. However, despite this similarity the technological know-how varied quite significantly, like a question about digitalization was able to reveal.

> *"How about it, is technology familiar to you?"* (DCL3G2facilitator)

> *"No"* (DCL3G2P1)

> *"Though I do have a mobile phone and email"* (DCL3G2P1)

Despite some acknowledgement of digital devices and solutions, the follow-up comment revealed just how fragile the understanding might be.

> *"It is just that I do not understand the terminology being used: what does what mean?"* (DCL3G2P1)

Of course, the quote represents only one person's perception of digital technology, but as the theoretical approach revealed (see, for example, Negroponte 1995, Maceli & Atwood 2011, and Nelson et al. 2017) the technology is often perceived as troublesome for individual reasons that relate to the subjective perceived offerings of the technology. And even though we are nowadays surrounded ubiquitously by information and communication technology, the sheer scale of all things operating digitally can cause insecurities and annoyances toward the artifacts and solutions, as Norman (2013) suggests. The person handling their daily activities well using devices and applications with which they are acquainted can still feel like the master of none of none of them when questioned, as seen in the opening quotes. Digitalization is all around us, presenting many perspectives. Something the participants agreed on was that digital development is becoming more pronounced, as the spread of digitalization was seen as something quite obvious.

> *"I have that experience as well, that no one is fully outside digitalization. Cannot really define any profession, it always touches people somehow."* (DCL1G2P5)

The same is experienced in the work environment. As the participants in the Organizational Jury gathered to innovate for organizational development, one member of the group made a remark that truly presents the current state of the digital medium:

> *"We have been here for ten minutes, and digitalization has already conquered the conversation."* (OJD1G2P1)

As shown, the topic of digitalization easily dominates developmental conversation but participants highlighted how the technology still needs to be found suitable for the domain in question. The participant added that the core of work and services is interaction with children, which is not to be replaced by any form of digitalization (OJD1G2P1).

With the current technologically charged societal development in mind, it is easy to argue that the previous notion presents a very accurate view of modern-day society and its development (see for example Castells 2010; Mannermaa 2007). The Digital Café participants in all three locations mostly appeared to consider digitalization in a positive light. Some even surprised with attitudes that reflected their position as early adopters of digitalization possibilities. The nature of the digital medium (see Chapter 2.3) is obvious in the conversations, with one attendee referring to digitalization as possessing the potential to outpace previously known and dysfunctional ways (see also Bekkers 2012: 331).

> *"Somehow it is just very natural to do things digitally, and it bothers me when all the things do not work as well as they should."* (DCL2G2P9)

For organizational development, the opportunities of digitalization were perceived as a way to do things differently, but at a same time their novelty introduced a learning curve. Along with learning, the evolving digitalization also requires user willingness to change previously learnt behavior and adjust to technological means. But despite the obstacles, the winning opinion still supported digital integration, as it was perceived to introduce advances.

> *"That digitalization is something that would answer the serious need for information sharing in my mind. But it doesn't have to be anything too difficult … but just like we could do things a bit differently. … of course, many other factors come along, like money, and education, and the willingness of people to come along. But it has a great potential."* (OJD2G3P2)

"It is well put here, that technology is coming: do we want it or not?" (OJD2G3P4)

"That is correct." (OJD2G3P2)

"Exactly." (OJD2G3P1)

While the Organizational Jury conversations dealt with structural issues related to the facilities, information sharing, and communication matters, the topic of digitalization always came up in some form or another. Digitalization was mentioned because diverse technological artifacts, solutions and comprehensive systems were seen to improve organizational operations.

The impact of digitalization affects previously known functionalities, with the intention to serve people's needs appearing as the characterizing feature of digital nature, as Kramer, Noronha and Vergo (2000: 46) have suggested. While the comment (DCL2G2P9) above could be interpreted as representing a person with a high technological skillset and know-how, the current ubiquity of technology is making features more apparent to a wide audience. The members of the Digital Café generally represented digitally well-suited citizens, despite their average age being comparatively high, which could be seen as countering factor for adaptation to the digital era. Heart and Kalderon (2013) support this idea, as they presented a negative association between age and the use of ICT; however, a strong willingness to use the technology was found when the ICT was perceived to provide sufficient advantage to the user, as the Digital Café conversation demonstrates.

Some DC participants' background represented a strong digital awareness, as the events gathered people working for regional development who were also involved in digitalization. They were joined by entrepreneurs and remote working people taking advantage of digital connectivity and information-sharing or just expressing a general interest in the digital world. One participant in particular had been a digital pioneer as he had been hosting a rock band's fan site from 1995.

Despite the positive atmosphere toward digital development, the participants still managed to remain objective on the topic. Technological solutions and artifacts can appear unfamiliar to people, especially to an elderly population that has been faced with constant technological evolution during their lifetime. Even if digital artifacts are becoming more and more ubiquitous, their presence is still mostly intangible, which challenges the user who is accustomed to something else, as Croon Fors (2010: 27) describes. A perception arising from the group discussion about digitalization supports the statement expressed by one participant, that adopting

technology can feel very uncomfortable for those who are not naturally orientated toward it.

> *"Drinking tar, for those who are not naturally acquaint with the technology."* (DCL2P2P7)

Similar insights came from the OJ participants. In an early conversation one member described a fear of digitalization that almost inhibited them from taking part in participatory development.

> *"I felt that I just have to come here, I was so thankful of the opportunity. Then came the virtual link, I was like oh no. I don't want this. Quite frankly, that's what I thought. But then again, I overcame my fears as there will be just ordinary people that I will come to have a discussion. Personally, I don't know much about computers, but I thought that the life cannot be that I will get anxious about that, and anyways the actual conversations are done in face-to-face."* (OJD1G2P3)

As seen, the ubiquity of the technology and expanding digitalization is making people apprehensive. But as the same participant went on to say, as the solutions become known over time, the objections against new technologies soon fade away. This perspective is also supported by Heart and Kalderon (2013), who state that when people are motivated to use computers, the digital obstacles can be overcome even if users are a little older age, as stated by one DC member:

> *"When looking a little further, to the years when we are in our seventies, yes sir the data will be flying."* (DCL2G2P7)

Technological development is undoubtedly progressing ever further, as the history of technology demonstrates (see Chapter 2.4.1): this will be simultaneously motivating and creative of opposing forces against development as more and more actions occur digitally. The development of ubiquitous digital technology has brought computer technology closer and made it more accessible to people than ever, but the effects of polarization and exclusion among citizens can also be detected as undesired outcomes of the development (see Maceli & Atwood 2011).

Despite the polarized opinions, the empirical conversations also presented the digital advances as something to desire. Among the OJ conversations, the computer technology was regarded as a norm that workplaces should be utilizing and providing for services. Deficiency in the computers, networks and solutions earned judgement from the participants. One participant stated that digitalization has become

a norm and the fact that children are not able to use any computers during their clinical stay seemed anachronistic.

> *"It is for sure a financial question but in our clinic, you are not able to use any computer technology with the kids. These days, that feels like quite a basic requirement, in my opinion."* (OJD2G2P3)

The same reality was also recalled from the employee perspective. The technological solutions and systems were described as bringing ease and safety to the job as the employees would have easier, faster, and more secure access to critical information.

> *"This is unbelievable, you don't have video projectors or anything in here!"* (OJD2G2P4)

The desired uses ranged from the customers' entertainment and education to the treatment-securing software where the digitalization was expected as an obvious element.

> *"Tablets and such or some type of computers, that could be used with kids. And then absolutely for the nurses, the kind of computer that they could use to access that medical software."* (OJD2G2P1)

Based on the conversations, the ubiquity of technology represents the current state of developed society, and is perceived as normal within services and organizations, along with the adequate infrastructure to support the development. But as can be seen, the perception of digitalization also raises worry, fear, and objection, demonstrating digitalization's twofold nature. The impact of ubiquitous digitalization thus derives from the answer to the question, what is digitalization to people?

5.1.2   What is digitalization?

Throughout the events, diverse opinions were expressed on a variety of use cases, hopes for the development and restricting conditions for the utilization of digital technology, both in the rural and the organizational environments. The positive attitudes are pronounced in the discussions, as people see digital transformation as providing hopes for easier working conditions, greater wellbeing, and as a part of self-improving and maintaining a competitive edge in the work markets as well as being essential to societal development. The insights minimize the challenges that development brings for the adoption of technologies, integrating them to different processes and causing people to adjust to changing routines, which is what

Rodden (2008) and Tzortzaki and Mihiotis (2014) raise about the management of the evolving knowledge capital.

> *"Digitalization interests me because I want to keep myself adequate at the work markets, keep myself in this society and use all these new services. I want to execute my work easier and more flexibly, and this way makes my life easier."* (DCL2G2P2)

> *"Yes, digitalization does interest me and I have gotten to know about it the meaning of it. I consider it an important aspect for countryside living. Digitalization is the only way forward, that just is true."* (DCL2G2P1)

> *"No matter where you work, no matter where you live, that Internet connection is vital."* (DCL3G1P1)

Positive opinions still raise a very relevant question about the digitalization:

> *"One big question is ... what does this digitalization mean?"* (DCL2G2P1)

Despite the hype and hopes that has been laid on the phenomenon (see Henriette, Feki & Boughzala 2015) its meaning still appears different for different people, as the diverse perceptions and broad range of discussions demonstrate. The outcome reveals that the abstract nature of the digital transformation, its meaning, its effects and the hopes it provokes appear subjectively according to peoples' personal interests and motives. Different people have diverse motives for utilizing digital means, and according to those motives and interests the concept also defines itself differently to each. Therefore, it is meaningful to explore the individual perceptions of digital transformation (see Chapter 2.5.1).

The previous section offers a brief view of how digitalization can be understood differently and what kind of challenges can be expected with the broad integration of technologies with which not everyone is familiar. Among the people participating in the Digital Café and Organizational Jury events the perception of digitalization clearly appeared as a means forward in relation to the expected societal and occupational changes; participants stressed job markets, as well as digitalization's position as an important feature supporting people's comfort and wellbeing, rural opportunities, and better work processes and service outcomes.

One interesting point of view that was raised was that technological development was not perceived as a frightening change but as means to do things smarter, better, or less stressfully.

> *"I would agree on that, why do things the hard way when you can make them easier and wiser."* (DCL2G2P4)

The comment reflects the added value that digitalization can bring to people's comfort, wellbeing and effectiveness in work. Digitalization was seen as an opportunity to do things differently and better among the participants of the Organizational Jury as well.

> *"Specifically, one is this communication system. Could there be as well, we have still those paper forms that the parents are required to fill in. The electronic forms could be filled in in peace at home."* (OJD1G1P6)

The digital medium was perceived as establishing faster and more convenient work methods and communication within the services. It would liberate families from receiving paper letters and numerous forms to complete, and the change would also archive the information in one location and help with information management not only among the patients but also among the clinic employees. The digital progress highlights the evolution that Drucker (1999) described as the rise of the knowledge society, to which Bajer (2017) added the empowering aspect of digitalization that can be gained by handing over mechanical tasks to machines. This "hype and hope" of digitalization, as an expression of trust and belief in digital development and the advances it is expected to bring, even manifested as a vision for the future among the DC discussions.

> *"Rääkkylä, the digital diamond"* (DCL2G2P7)

The quote expressed a development aim that committing to digital development would generate a way forward for the town.

A counter to the high praise of digitalization came from the OJ as the discussions turned to the ways in which technology could help with the increasing paperwork. The idea began from a recognized obstacle at work, as the extensive reporting and documenting requirement was felt to take too much time away from the core of the service. The discussions reminded participants that the social and health care sector is orientated towards people and customer-related interaction, and any focus elsewhere is an unwanted feature. The remark emphasized consideration of the main task, to which the evolving digitalization was hoped to offer support.

> *"The time spent sitting in front of a computer is expanding all the time due to different sorts of reporting. That is again away from the patient interaction. Reports have to be made, so you have to rush to the*

> *computer to have time to record all the day's events. So, some assis-*
> *tance with these issues"* (OJD1G2P2)

The workload from excessive reporting responsibilities and other so-called paper-work tasks was recognized by another group as well.

> *"a great deal of work time goes to the reporting, and so that there is*
> *for sure a lot of that overlapping work."* (D1G3P2)

> *"On the other hand, it is understandable, the amount of paper is enor-*
> *mous."* (OJD1G3P4)

Digitalization solutions were wanted to help with the work arrangements so that the benefit could be directed to the care of families and addressing children's issues. But parallel to the hoped advancement of digitalization rises an opposing observation. As the developing technology promises aid for multiple tasks, it was also recognized as creating problems.

> *"Time should be found for the professional work of a health care ex-*
> *pert. We seem to have a trend that brings work, that takes time away*
> *from it."* (OJD1G2P1)

The comment expressed that the digital artifacts, solutions and systems being eagerly adopted to the organizational workflow do not always support the main task in the best possible way. Systems are not always created with the work task or the employee in mind, which leads to dysfunctionalities or unsatisfactory experiences. The group wished digitalization to act more as a support than a demand, as the latter makes it appear more of a burden than an advance. Overall, the conversations drew attention to the diverse meanings given to digitalization, which can appear with highly positive endorsement as long as it is executed with a holistic consideration. The meaning of digitalization thus comes directly from the considerations among the developmental work.

5.1.3   The developmental aspect of digitalization

The events were introduced with a developmental intention, where participants were to express their insights, hopes and opportunities relating to the evolving digitalization. In the Organizational Jury the digital aspect appeared as one of the predefined topics. In both instances—i.e., among the regional-focused digital development discussion in the Digital Café, as well as in the hospital organization-focused Organizational Jury—the digitalization-targeted discussions easily adopted a development-orientated focus. The developmental aim drew the focus

to services, to cost effectiveness and to the offerings of the digital solutions. It also led to acknowledgements of how digitalization is already influencing work and leisure activities.

The participants were given a presentation about the digitalization opportunities with the intention of informing them but also to inspire them to have innovative conversations. The presentations seemed to provide good grounds for getting into the development mode, but despite the sophisticated opportunities that the technology has to offer, participants rightly commented that the aim of development and the intention of the technology is to serve the needs of the operations.

> *"The digitalization presentation was quite impressive, but it got me thinking that how do we make the digitalization work for us, for our benefit. Not so that it becomes a purpose in itself, that hey we got something new and impressive here."* (OJD1G2P4)

Digitalization was seen to introduce many supporting benefits to the work surrounding, which, in the case of the OJ, related to the care processes. However, despite the opportunities, because the services in hospitals are based on reciprocal communication between the health care professionals and the patients digitalization was met with justified hesitation in the areas where it was perceived to gain too much control over care provision. Within interactions, the personal touch was felt to be too vital for the service process to be given to digitalization, as it might jeopardize the quality of care.

Even if the OJ participants were somewhat hesitant towards digitalization, the approach was still involved in most of their final development suggestions, which will be presented in Chapter 5.3. This observation follows the general insight from the DC as well, like the member who expressed that digitalization is considered an effective source of developmental opportunities. For example, among public services such as libraries the work contains a strong requirement for development orientation, and digitalization is seen as an obvious direction for development (DCL1G1P4).

Part of the conversations even took the imaginative turn that was hoped for and let the ideas flow without mental restrictions. The theoretical perspective encourages liberated creative thinking that aims to produce multiple choices for later evaluation. Meanwhile, the collaboration aspect offers the chance to create the required holistic view, as Razzouk and Shute (2012: 331) described (see discussion in Chapter 4.1). The researchers suggest creative thinking as a method to unleash ideas for meeting targeted needs: it can happen even without full acknowledgement from the members but still strive to meet or, even better, to exceed prior

expectations. The creative design process aims to unleash the desired imaginary freedom for creating a variety of options for further evaluation, in the same way that the participatory design process succeeded in the DC and OJ processes (see Jensen, Thiel, Hoggan & Bødker 2018).

A self-driving car acts as an example of this creative thinking that the participants utilized when considering the future.

> *"In the future, cars will be running without a driver and we do have this fast broadband connectivity"* (DCL2G1P4)

> *"Yes, that could be suitable for us. They would just be running, without the need."* (DCL2G1P5)

> *"Without the need of a driver."* (DCL2G1P9)

> *"The traffic is so minor that there wouldn't be any fear of traffic accidents. Few cars would be driving there around town 24/7. You just use something to stop it and then it drives you were ever you want."* (DCL2G1P4)

> *"Yes, this is way better than I thought. I thought about railway, but this is way better."* (DCL2G1P6)

Digitalization was generally perceived as bringing anticipated advances on many fronts, in the areas of work, wellbeing, education and entertainment; it was also expected to provide various opportunities for business. The issues discussed were seen to function in favor of rural towns and other areas facing the loss of their citizens to bigger centers, and in support of their service offerings. Even though digitalization was mostly seen in a positive light, it was also recognized that technology-filled time is also creating a more hectic atmosphere as the pace of work methods and processes speed up thanks to the "flying data" (DCL2G2P7). Technology is thus viewed as a double-edged sword, simultaneously bringing advances and creating shortage, bringing wellbeing and causing stress. This was recognized among the OJ participants as they advised being intentional in the utilization of digitalization for development.

The outcome represents a requirement or restriction of the digitalization depending on the view, and Duchkek (2020) recognizes this consequence as the demand of resilience, which aims to cope with and manage the discomfort and uncertainty that digital integration can produce among people during the transformation. Ritter et al. (2014: 43) thus suggest the user-centered approach to development as a remedy to prevent the unwanted cause-and-effect outcomes of digital

development. On this matter, Norman (2013: 32–36) emphasized how the design of artifacts and solutions can be directed to address the user's wants and thereby try to prevent possible resistance. Despite the possible threats, the countryside was seen to have the opportunity to benefit from the effects of digital transformation.

> *"Maybe it is the savior of these rural towns, that when you feel over-loaded with the digital and technology issues, we can here offer that counterbalancing."* (DCL3G1P2)

It may be that the user-centered design approach in the development process helped to direct perception more toward the positive outcomes and pushed the requirement of resilience to one side. Nevertheless, counterbalancing offerings from nature were found from activities and features such as fishing, hunting, peacefulness, and cleanliness that provide that much-needed balance to the rush of technology-filled work time. The theoretical approach suggests that without the possibility of these balancing activities, the attraction of the used solutions and pleasant user experience can ease the frustration and irritation that otherwise dysfunctional digital solutions and systems can cause (see Negroponte 1995: 89–92).

Despite the holistic observations and imaginative thinking, the participants still regarded the Internet as the vital part of digital development. When people are searching for a work-life balance from nature, the environment still needs to be sufficiently equipped to meet work's requirements. The observed locations were advanced in this area, but the future still raised curiosity about what the connection could bring.

> *"It is interesting to get to know what kind of services and things can be accomplished through broadband Internet connection."* (DCL2G1P1)

5.1.4   Requirements for the digital transformation

Despite the positive atmosphere in favor of digitalization it became clear that the existing opportunities come with certain requirements for the concept to be fully utilized, as the previous chapter already briefly touched upon. Broadly speaking, the requirements are considered within a holistic view that takes into consideration different aspects of the human use of technological artifacts and solutions as well as the infrastructural needs for the technology. As an expression of the holistic approach, the utilization of technology for regional development also ties the involvement of political aspects into the considerations when the solutions are assessed comprehensively, as the participants demonstrated in conversations. From

an institutional perspective, the same cross-tension can be seen from the stake-holder view, where politics, management, employees, and customers all appear with their unique perspectives. This is why things need to be seen to their full extent.

> *"It does not make any difference to be experimenting with a single solution, but we need to invest on a larger scale"* (DCL2G2P7)

Observations rising from the conversation (DCL2G2) included, for example, a single solution like 3D printing being desirable but alone it doesn't yet solve anything; digitalization and politics need to be combined with development; and digitalization needs be thought in this larger picture. The previous insights associate with the theoretical approach of ecological thinking, where the ecosystem of the digital artifacts is considered in tandem with the individual's subjective relation to the utilization of the digital entities. Eventually, the interconnectivity forms a complex network of actors and features, that Jung et al. (2008) present as the ecology of artifacts.

Through the ecology of artifacts, the human factor of perceiving, thinking, and doing becomes connected with the development work that also requires different levels of testing, evaluating, and adjusting based on the insights gained (Jung et al. 2008). One expression of this was that the participants saw it as vital for the projects to have enough time for the people involved to gain informed opinion as well as expertise about the matters to be decided upon.

> *"It becomes clear as an important aspect that they (development projects) need to be long enough. … It needs to be so long-lasting that you can gain experience and that people have enough time to think through the effects and outcomes related to their life. You need to get enough repetition that you can say for sure that is this good and what should be done and be developed."* (DCL3G1P6)

The deliberative principles, as they ensure the quality of the process, suggest that the processes should last long enough for the involved members to truly comprehend all the relevant information and perspectives (see Chapter 4.4). The user view appears congruent with the research philosophy (see Figure 3) that expressed how holistic understanding requires an interpretation of multiple knowledge sources and the iteration of knowledge throughout the process, so that awareness has the potential to grow to its full extent. The user-centered approach of the participatory-deliberative design promotes this iteration of knowledge from the participatory design process perspective as well as from the discussion quality perspective that uses the deliberative democracy approach (see Chapter 4). The participants

agreed on the importance of user involvement in developmental work, for example from the functionality, accessibility, and legitimacy perspectives (see Chapter 4).

> *"What would this mean in the case of digital pilot projects?"* (DCL3G1fasilitator)

> *"The users should be included in development already in the planning stage, so that it would not be implemented from above."* (DCL3G1P6)

Of course, a sufficient level of interest and motivation is required for participation, whether it is drawn from an economic, political or some other benefit—or even just from a straightforward interest in the topic, as this member of Digital Café expressed:

> *"It is a thing that interests and we have a house full of geeks."* (DCL1G1P2)

In addition to willingness to engage in user-centered development, success also requires aptitude for design thinking as certain levels, as we saw from Brown (2008: 86-91) in Chapter 2.6.3.

Similarly, common interest and motivation for development also acts as the cornerstone of the co-creation that depends on the aspects of shared knowledge and mutual learning, as introduced by Torfing et al. (2016). But as the researchers explained, the interest also needs to extend to the joint interaction and co-creation that wants to hear and consider all perspectives on the matter. True collaboration in co-creation can bring out novel perspectives that enable a better understanding of the context and support successful outcomes. The shared perceptions within discussions help to reveal the members' subjective views and relationship with the context, which again enables a deeper understanding of the issue and the perception of the affordances that can be discovered, as Gibson explained in his theory (see Chapter 3).

The infrastructural requirements for the digital medium became very evident from the discussions. The comment below highlights that despite the current artificial intelligence and machine learning developments the concept of digital technology still refers to human-made artificial creations.

> *"Digitalization does not exist in the environment; it needs to be built."* (DCL1G1P3)

As an artificial creation that branches in many directions, digitalization can be cumbersome to comprehend in all its aspects. Digitalization readiness needs to be

considered and build into our environment but the understandability and usability required of them need to translate to the user, which the perception of affordances reflects (see Hutchby 2001: 441–442; Gibson 2015: 229). Thus, all aspects of the technology need to be considered when creating new infrastructures in line with the holistic view that the participants voiced in conversation.

Among the considerations, a solid access to the Internet with functioning data networks was recognized as the key feature, because connectivity forms the vital link to every digital opportunity. The claim was noted in the previous chapter, among the development aspects of digitalization, confirming how most of the digitalization aspects go together.

> *"Everything is going to the internet: this way the future development could support it. Everything from bicycles etc. that can be connected to the Internet of Things (IoT) enabling better use of sharing economy, so that you can share your location, share the vehicle location etc."*
> (DCL2G2P9)

The Internet of Things is one example of a digitalization concept that shows the interconnectivity requirements between artifacts, solutions, and systems. While these interconnected devices and solutions enable more versatile use of the artifacts, at the same time they also alter the whole meaning of the digital medium. They provoke questions about what it is and what can you do in and with it (see Chapter 2).

Related to the data networks, the involvement of these specific Digital Café locations was a conscious decision due to their strong fiberoptic data network. The decision to use these locations was suggested and supported by the project consortium, but the choice also provided a preliminary assumption that the people living in the area could already obtain reasoned evaluations about the characteristics of digitalization (see comment DCL3G1P6 from the previous chapter, and Chapter 4.4). As the areas contained a valid and stable Internet connectivity, the participants acknowledged the importance of a functional network infrastructure. It was raised in one of the groups (DCL1G2P5) that the technology side of digitalization was already well taken care of, and the missing piece is only the permissive organizational culture. A restricting feature was the prejudice against remote work.

The importance of valid connectivity became clear throughout the groups and the issue raised even a slight neighborhood pride among the participants. The strong digital infrastructure can promote better conditions in the countryside than is possible even in the busier cities.

"One city official was chatting in the yard, saying 'I'm jealous to you, we don't have this good an Internet connection even in the city of Es-poo'." (DCL2G1P9)

"He could not even think of doing remote work due to the connection, so this broadband is a benefit for us that is worth taking advantage of." (DCL2G1P9)

The digital-ready infrastructure was recognized as one important area for development, as it was seen to promote safer, more secure home living for the elderly while supporting (for example) students' needs, thus creating a rural landscape more attractive to a wider population (DCL2G1P4). The utilization of technology emphasizes the human social factors involved in the functionality and usability of the integration. Issues such as learning, access and financial resources were among those recognized in the group (DCL2G1) as social factors that require some attention for digitalization to become a utility for all. As was found when answering the question 'what is digitalization?', technological development seems to be the way of the future. But even if the participants saw digitalization as a helpful tool offering life- and work-supporting solutions, the worry about possible digital marginalization and polarization in the population remained. There does not seem to be an end to technological development, but people's ability to cope with the development is a major question.

"I have experienced that with my own father, who is over 80 years old, when my younger brother put a computer in front of him and expressed that here we go. That is because when you are young you have the abilities to learn these things but as you get older it takes time." (DCL1G2P2)

It becomes apparent that there are many positives in what the digital medium affords to people, like safety, comfort, and promoting the attractiveness of the area, but negatives lie alongside the positives. One example is the fear of marginalization and polarization when everyone does not have the same resources to connect to digitalization. This does not refer solely to financial matters but even more to digitalization-related abilities and skills, as suggested by the socio-technical aspect (see Shin 2014) and the evolving service sector (see Chapter 2.5.2). The participants also found that the lack of know-how is more pervasive, and not limited only to the elderly population. It was mentioned that a major portion of the population remains without necessary computer skills and resources, as found among public library users who comprise a diverse group of people.

> *"Library receives a lot of requests from citizens with computer-related issues"* (DCL1G2P3)

It was possible to interpret this from the DCL2G1 discussion. Digital development forces people to update their knowledge base, not only on the available technologies but also about how and where they are utilized. Because people live their lives according to their individual life goals and routines, technological spread does not necessarily reach everyone, for some of whom it is neither necessary nor even interesting.

> *"Then they have to start digitalizing then, but there is lot that is needed to be done. If teacher has had their education during the '60s they are still living in that time."* (DCL2G1P8)

But with strong inner motivation, digital technology does not necessarily create obstacles, just barriers that can be overcome, as can be seen from the quote below. One example from the group demonstrates how an older person can also learn new technologies, as computer technology was introduced to him 20 years ago as a new thing as he was approaching retirement. He currently manages computer tasks superbly. The issue was also supported by Heart and Kalderon's (2013) research on older adults adopting ICT.

> *"Since I have seen your technological development close by. ... You can really learn even if a little older."* (DCL2G2P4)

5.1.5 Restrictions of digitalization

As nothing is without challenges, even the digital enthusiast group was able to identify limitations that progress is bringing. One major difficulty (as it would be with any development) is focusing on the core challenge and recognizing the main issue. In the countryside, the digital transformation cannot by itself fix the area-related deficiencies, but the aims need to be targeted at the core challenges. The DC participants did well in their discussion. Their observation was that many of the conversations concentrated on the topic of attracting more residents to occupy and inhabit the area.

> *"The preventing factor is where can we find the residents."* (DCL2G1P5)

Along with considering the actual demand for digitalization, environmental readiness was also one of the core factors that the OJ brought up. The somewhat sarcastic comment below reveals the current state of the digital surroundings.

> *"At the moment we do not have secure Internet access. The main building apparently has, but not us. Just a minor thing in 2017, small things. But I hope we would be getting it to the new facilities."* (OJD2G1P4)

The broad and successful integration of digitalization becomes almost impossible if there is no sufficiently capable supporting IT infrastructure. These issues justifiably return the conversation about digitalization to the required core issues of adequate infrastructure and actual need. As a result, the affordances of digitalization need to meet the restrictions from the location's environmental or structural surroundings, and provide features that would push the recognized challenges aside.

The solution is found in promoting alternatives that overcome the deficiencies or by rendering the deficiencies invalid. The DC participants expressed good development ideas, and ongoing projects are building strong digital infrastructure for the area and providing new structures, like the Mummola project for digitally supported living, among others. The ideas generally promoted digitalization of services and supported the IT infrastructure in finding suitable solutions. Many ideas aimed to improve the ease of use and attractiveness of both the digital solution and the service, product, or content in question. But the missing factor—the residents expected to reside in the buildings and use the services—was still recalled as the main challenge.

In general, digitalization was seen to enable enormous numbers of new business ideas that expand rural opportunities and help to keep the countryside inhabited. The insights on restricting factors raised, rather surprisingly, administrative and political actions as the bottlenecks or barriers to positive development. The governmental restrictions were perceived as a worrying thing preventing the creation and use of new innovations, instead of the Government supporting the ideas, as one participant argued (DCL1G2P5). This observation is neither new nor rare: McNutt (2014) demonstrates how change needs to be considered holistically, paying attention to the organizational, cultural, and administrative tensions.

Overall, digital transformation was considered to come to every sector, and within the development the results were seen to overcome the obstacles. The restrictions were seen to be pushed aside for future development, resembling the 'creative destruction' described by Joseph Schumpeter (see Bekkers 2012: 331).

> *"No worries, when the government starts to squeeze university funding, people start to drop off and they have to turn to digitalization."* (DCL2G1P9)

Of course, progress is not always pleasant, and creative destruction can occur at the expense of issues that people do not want to give away. Digitalization can function simultaneously as the source and resource of change (see Chapter 5.1.2), corresponding well with the concept of resilience, as anticipation as well as coping mechanisms can easily become a necessary feature of evolving digital transformation (see Duchek 2020).

An example from Sweden was brough to the DC conversation, where good work practice was found when digitalization enabled working while commuting and thus supported the smart use of time for everyone's benefit (DCL2G2P7). Work regulations can function in a situation like this either for or against the new methods. To support the functionality, the administrative actions need to find a way to adapt and promote the developing solutions. A general view of how technological development steers and pushes the societal development (see Chapter 2.4.1) reminds us of institutions' requirement to function at the forefront of change, rather than restricting developing methods. Restrictions promote undesired outcomes, like citizen resistance and disobedience, as well as undesired progress from the institutional perspective like the creative destruction presented the view of development (see Bekkers 2012; cf. Norman 2013: 32–36).

> *"I do not understand what the Kainuu leaders are waiting. the remote care solutions are so obvious when there is the knowhow and technology is affordable. I do not accept that the service cannot be offered outside of the 15-kilometer radius."* (DCL3G2P5)

The issue shows how digital development involves multiple interrelated issues arising from the many perspectives held by individual representatives. The restriction again highlights the likelihood of conflicts and tension between the involved parties, when choices need to be made by putting individual interests aside and settling the decision with the best information available (see Chapter 4.3). The work in the hospital surroundings is a good example of an area that involves the consideration of multiple perspectives, and OJ participants highlighted how the strict information security issue inhibits the flow of the work. Information security presents itself as an obstacle where digital development was hoped to introduce help and support.

> *"On their own field of expertise, an employee can prepare with their colleagues. Social worker and child protection in their own field, ... if you could share even emails that would be great, but you cannot not just yet."* (OJD1G3P1)

Along with information security, hospital organizations are characterized as highly bureaucratic work environments, which also brings its own challenges for the operational flow. The sensitivity of the issues, patients' rights and a bureaucratic work culture all create a challenging environment for digitalization to fit into.

> *"For now, we are living in a time when regular employees cannot even ask us. At least specifically, without a doctor's referral."* (OJD2G3P1)

> *"It is an information security risk, she cannot."* (OJD2G3P1)

> *"Consultation team can call, and another professional can consult them without referring to the child's or family name."* (OJD2G3P1)

The OJ conversation revealed unimaginable tacit knowledge that is nevertheless required for a whole discipline- or organization-wide process to function properly. The insight highlights the need for attention to detail, which must feed into digital development. It is not only the ICT systems, solutions, and artifacts, and potential users that must be considered; the organizational work culture itself must factor into the development path.

Despite the obstacles and boundaries associated with digital development, its advantages seemed to outweigh its disadvantages. Chapter 5.1.2 introduced the participants' perception of digitalization and revealed that the dominant insight seems to be "why do things otherwise when you can do them better?" This could be stated as the main ethos for all developmental work generally. As long as computer-related technological progress remains an artificial, man-made environment (see Simon 1996: 21-24), the surroundings can be adjusted according to the users' desires. The Digital Café provided a developmental atmosphere where this perception seemed underlie the conversations.

> *"Somehow it is just very natural to do things digitally, and it bothers when things do not work as well as they should."* (DCL2G2P9)

5.2 The perception of digitalization: the self, the surroundings and the digital artifacts

Any comprehensive view of digitalization introduces multiple perspectives for consideration. Previous chapters showed that digital transformation offers many features of which to take advantage and many features to remain cautious towards. Often the outcome is in the perception. How is digitalization being viewed? What are the intentions being sought from it? What is the context for the use of

digitalization? The qualities of the digital artifacts, solutions and systems appear to the observer based on the observer's unique, subjective perception, which is guided by the characteristics of the artifacts and the values and motives of the observer. This "way of knowing" is explained by the theory of affordances outlined the Chapter 3. This dualism (see Chapter 3.3.1) encapsulates the elements of the digitalization and the character of the observer, but also illuminates the qualities of the surroundings so that the functionalities and dysfunctionalities of the digital transformation can be detected.

Since every environment and every artificial creation differ according to the subjective view by which they are perceived (see Chapter 3.1), it is worth paying attention to the individual thoughts and insights from the targeted user groups. This research considers the insights of citizens living and working the rural areas in Finland (Digital Café), in the locations of Kauhajoki, Rääkkylä and Kuhmo (see Chapter 4.2.1); and the stakeholders related to the operation of a children's psychiatric clinic in a university hospital (Organizational Jury) (see Chapter 4.2.2). The stakeholders represent the clinic in miniature form, involving personnel from the doctors to the nurses to the clinic secretaries, as well as including children's parents as patient representatives.

This subchapter explores the perception of digitalization by considering the perspectives of the user, the surroundings and the digitalization. The findings from the three main perspectives are divided into the following subcategories, which ultimately reveal the participants' perception of digitalization:

- The point of observation
- How digital transformation fits the environment
- The appearance of the digitalization
- The expectations and the lifestyle
- Changing habits
- The usability and functionality aspect of digitalization

After the perception of digitalization, the analysis presents a summary of the findings so far. This then leads into to the final subchapter of the findings, *the digitalization of artifacts, solutions, and services*, continuing to more detailed analysis of the user-created digital means for utilizing the digital medium.

5.2.1   The point of observation

The theoretical framework (Figure 2) shows how affordances point in two directions: to the environment and to the actor. The point of observation reflects that

view of the affordances, simultaneously illustrating the users' interests, values and motivations as well as presenting a view of the surroundings with its opportunities, benefits, and disadvantages. The discussions reflected a satisfaction and even a sense of pride in the rural area, in the case of DC. Due to their perception, the participants did not want to turn rural locations into city analogues but instead concentrated on the positives that a remote location can offer and provide for people's wellbeing. The insights concerned both work and leisure time demands, although the work-related demands gained a slightly more prominent role as the digitalization opportunities strongly support the desired work-related migration to the area. 'Distance' proved to be one of the top issues for the conversation and so a lot of the discussions revolved around the following question:

> *"Here in the countryside, we are faced with the challenge of long distances, what kind of opportunities could this digitalization offer?"* (DCL1G1P3)

The comment reflects simultaneously the good and bad considerations of the environmental conditions. It was meant to raise the issue of the problematic commuting and transportation opportunities. But as is often the case with attractive nature destinations that appear in remote scenery, the nature offerings were brought up as one of the main attractions that the countryside has to offer, as the following demonstrates:

> *"For many it is about nature. For whomever has left and for the youth as well. It is the quietness and nature that attracts"* (DCL3G2P4)

> *"It is the quietness and nature that pulls, and for the young men who move it is hunting and fishing."* (DCL3G2P3)

> *"It must be that those nature-related activities are the top priority, and then it is the peacefulness of the nature and that is something that we have here. … So, we have only that nature that we can offer and the exploitation of it is one of the options."* (DCL3G2P4)

The focus was strongly placed on nature and the perception of affordances reflect those qualities that the different aspects of nature offered people. Some saw the environment as providing fishing opportunities or hunting activity, both of which would have afforded different features to people. Other participants specifically named the pureness and quietness as the affordance that nature offered them. The remote countryside location was perceived to offer benefits impossible for and hence absent from densely populated areas, like farming and agricultural work.

> *"There are a lot of let's say vegetarian people who would also like to grow their own food. Our location could also attract people who really desire to live in the countryside."* (DCL2G1P9)

As one participant commented, people have diverse attitudes and values, and for some the natural environment is the place to fulfill their passions. Sometimes the offerings of the nature environment provide such attractive temptations that people are willing to make a conscious lifestyle change and live rurally, as happened with one participant:

> *"We didn't have any connection to here, we just happened to get a beautiful place to live in beside the Lentua natural park. We had to come. And we have had no reason to leave."* (DCL3G2P7)

Evidently, people are willing to adjust their lives, (i.e., their location, way of life, etc.) at the expense of abandoning something familiar to gain their valued and desired experiences. The effect reflects a conscious or even subconscious behavior guided towards an emotional affection, which requires a certain level of cognitive flexibility, which in turn is necessary for someone to pursue their dreams instead of strictly controlling their behavior when faced with new possibilities (see Diamond 2013). Of course, not every action requires life-changing behavior and as such appear more easily tempting, but as Diamond (2013: 149) stated, change does require cognitive flexibility of a person, which is why the aim should be perceived as something attractive and desirable to pursue. Regarding the digital environment, the design features built into the solutions function like their natural equivalents by attempting to appeal to the participants. Digital technology design is at its best aimed to appeal, attract, and provide a joy of use to the user, as Chapter 2.6.2 discussed when quoting Zagel and Bodendorf (2012: 697).

The digital medium can be altered to meet the desired point of observation, as the solutions can be crafted to possess the attributes the targeted user group desires and values (see Chapter 2.3). These attributes can fascinate, attract, delight, bring joy, or provide a pleasant user experience based on functionality and ease of use of the product (Zagel & Bodendorf 2012: 697-698). In the case above, the opportunity of working remotely and being provided with a fast broadband Internet connection functioned as the sufficiently satisfactory trigger for the life change.

The downside of living in remote locations is the long distances that bring the immediate challenge of travelling, including the lack of nearby services and the raised costs of transportation. Statements like "transportation is problematic in the countryside, too many cars are travelling too empty" and "sharing rides, for example carpooling" were mentioned in the DCL1G1 group. The long distances in the

countryside form an obstacle and a challenge for people that requires everyone to use their own cars. Not only the distance but the lack of transport uptake creates the barrier (DCL1G1P3) The issue relates directly to services, inhibiting access to the likes of education programs that would require traveling after working hours. Even if one had enthusiasm and interest for studying, the commuting aspect prevents participation. The digital perspective was recognized as affording a workaround to the issue through its electronic service capabilities. Remote studying and participating from home would solve many issues for educating oneself while living in remote areas (DCL1G2P1)

> *"Also, parents cannot leave for studying, first driving hundreds of kilometers and then spending time at lectures and doing exams. The wish is that studying could be done more easily."* (DCL1G2P1)

At the time of the project in 2016, the current remote studying and working opportunities were not commonly utilized, as the participants expressed in their conversations. This was despite Negroponte, for example, indicating several decades earlier that the expansion of digital potential would drastically change the speed and flow of information (Negroponte 1995: 11–15). Remote studying remained an example noted to have challenges on both the technological and cultural fronts, but the recognized benefits were still clearly guiding towards greater digitalization.

> *"The fact that you can study when you have the time and the inspiration."* (DCL1G2P3)

During the conversations, the participants recognized the ongoing transformation that not only means a change in technology but also a change in people's whole lifestyle, in work and leisure time. One participant raised an important point about the change in working lives, in which neither steady work nor retirement at the age of 65 are certain anymore. Along with work-life development that the digital development strongly supports, people need to accept mixing work and leisure time, as neither occurs in designated periods anymore (DCL2G2P4). Continuing the topic discussion, though, the changing work lifestyle allows more people to freely choose their living space, when work no longer restrict them to a single location. When an area can offer solid access to the internet, it can attract citizens to move to the countryside, where they can combine the luxuries of rural living with their everyday life. Such inducements include nature with its forest and lakes offering peacefulness, quietness, and cleanliness. Thus, the changes were seen with a positive mindset toward the uncertain future (DCL2G2P1). The attitudes reflected strong mental strength and acceptance of expected changes where digitalization should be seen as a way to get things done better, smarter and more efficiently. The change could support the development of a livelier countryside and the

promotion of the existing advantages over other areas. The observations resonate strongly with the theoretical perspectives (see Chapter 2.5).

> *"Digitalization has to be seen with a kind of a mindset that acknowledges that certain old operating methods and occupations will come to their end and new ones will need to be created to replace them."* (DCL1G2P5)

> *"We have to know that this digitalization is changing the appearance of work and of many professions, so that many professions cease to exist. When we are applying for a passport, we do not need to visit the bureau anymore. We have to acknowledge that many professions will be disappearing and now it is time to invent the new ones."* (DCL2G2P2)

Within this chapter the research observations and the participants' insights focused a great deal on the factors of how the people perceived their environment and the possible affordances within it. In most cases the digitalization itself remained in the background as an enabling factor for the environment- and lifestyle-based affordances. But despite its supporting role the technological artifacts and systems were required to appear functional, in terms of the reliability of their functioning, their ease of use and the pleasure of using them. The following discussion will proceed to the consideration of the environmental attributes and the digitalization features. The subchapter observes the relationship and fit between the environment and the elements of digitalization, as both offer their subjectively-experienced qualities to people.

5.2.2   How digital transformation fits the environment

The point of observation provided the users' perception of the environmental aspects where digitalization was seen to provide supporting features, along with a perspective on the expected future. The following subchapter combines the view about the environment with the digitalization opportunities. Within the DC conversations, the loss of residents to migration is brought up as a major topic, as the countryside will struggle with organizing and delivering services while the population is moving away. But the digital transformation and the early adaptation to it was seen as means for better living and a promise for a strong development of the rural areas.

> *"Utilizing digitalization so that we can gain more liveliness in the area."* (DCL2G2P2)

The DC participants shared a realistic view and expectations about the area-related challenges, where promoting a strong technological infrastructure and supporting novel technologies seemed like a potential and some cases expected benefit for the area's wellbeing and development. All in all, improved work conditions were seen as an issue that could prevent the emigration of people and balance the service offering, especially for children and the elderly, whose needs have become more challenging due to the lack of residents (DCL3G1P5). The support of digitalization was mentioned as something that would draw more inhabitants to the municipalities, and the effects were expected to bring more opportunities for everyone. Digital development had already brought positive changes to the areas and progress was perceived as introducing even more opportunities. This insight aligns well with the introduction of digitalization as presented in Chapter 2.2.

> *"Well, I have lived 22 years in the town and all the time I have been doing remote work at least as part time."* (DCL3G2P6)

The experience proves the digital opportunities to be possible, at least with a little adjustment and by testing and adapting to the available digital ways. As Rodden (2008: 3837), Maceli and Atwood (2011: 103), and Hurtta and Ellie-Dit-Cosaque (2017:2744-2745) described (see Chapter 2.2), the potential of digitalization challenges the user, but after holistic consideration and adjustment, it provides its benefits in a wide range of options to the user. Ultimately, taking advantage of digitalization requires accepting the need to compromise, learning new ways and testing the functionalities of the novel methods, as one participant explained when describing their behavior as they were looking into making the transition from a city to the countryside environment (DCL3G2P7). In general, the expectations appeared rather modest, creating realistic expectations for the digital progress to succeed in its goals.

> *"If we had more, for example students living here, that could make possible even to have two or three different exercising groups than now."* (DCL2G1P9)

The commuting and transportation requirements in the countryside were often raised in the discussions and the reality make people dependent on owning a car, and in most cases more than one per household.

> *"Own car is an absolute requirement; you can't get anywhere from here."* (DCL2G1P6)

> *"Own car for each person with a license. It is not enough that a house-hold has a one car, if there is three people you need two or three cars."*
> (DCL2G1P9)

The reality of long distances and low population density creates the outcomes that affect people's daily lives and thus appears as one of the biggest requests of digitalization. The demand of cars builds costs and creates requirements that might not even be possible or acceptable for everyone, which then pushes them to search for other options and alternative ways of doing things. The commuting circumstances also indicate the challenges that the surroundings set for the people and for the vehicles.

> *"Yep, at times we are not able to move without the help of a neighbor who come to pull us out from stuck situations."* (DCL3G2P4)

As driving is faced with these environmental challenges, the discussion showed how digital solutions for transportation and commuting also face the same conditions and obstacles that need to be taken into consideration with the digital transformation. In the case of self-driving cars, the conditions need be considered based on the location, as the participants pointed out somewhat whimsically when considering future developments:

> *"During winter it should have wings."* (DCL3G2P1)

The discussion highlights the required holistic view that becomes a necessity when planning and applying novel digital ways to the existing conditions, on which subject Nelson, Jarrahi and Thomson (2017: 54–55) were quoted in Chapter 2.3. While the suggested drones and other options can provide suitable solutions for transportation, the need to travel can also be highly reduced through digital means, which is where the discussion among the participants led next. With digitalization, the perspective of a location has become very different from before, as the observation points out. The distance to the municipality town hall feels comparable to the distance to a faraway country, like Singapore in the case of this discussion:

> *"During that afternoon the broadcast did not even come from the town, but it came from Helsinki. You do not have to be bound to any-thing, even if it would come from Singapore, it is all the same, as long as the connections are working."* (DCL3G1P6)

According to the participants, we are truly at a point that "when you look out a window, what you see may be five thousand miles and six time zones away", as

Negroponte said in 1995; all you need is a viable internet connection (see Chapter 2.4). The expression stresses the perceived importance and meaning of a functional and up-to-date digital infrastructure, which can then provide the desired and hoped-for conditions for work and entertainment. Participants brought up how the countryside is full of old town-owned facilities that are currently without a proper use but, properly equipped, could provide comfortable remote working facilities for people.

> *"They could be just as cozy as the one's at the center of cities since they are equipped with fiberoptic connection. It doesn't matter where you are. You could just travel that few kilometers and be working among that work community."* (DCL1G2P5)

The conversation exposed how people and their capabilities need to be remembered even if digital technology is progressing at an accelerated speed. Although the development of technology itself is moving quickly, how people adopt new devices and methods of doing things requires more patient and subtle approaches. The digital change is maybe not constantly on everyone's mind and the intended uses for certain solutions and services might end up taking a different turn than expected.

> *"This was supposed to be a service network we were building but now this is this type of entertainment and whatever network. … For me information society is means toward equal access to services and now we have all the means for it but rather reluctantly people are reacting to these try outs of ours."* (DCL3G2P5)

> *"But it was a bit surprising that as we started to take the turn to electronic invoices, it was fifteen who had addressed in advance their interest toward it and all of a sudden we have reached a number of 57 electronic invoice users."* (DCL3G2P5)

Even if the comments represent opinions only from a narrow source, they still provide much for interpretation. On one hand, development needs to be considered from multiple perspectives in order to achieve the intended aims. The intention and offerings of a digital infrastructure appear to people according to their interests and motivations. People might not be thinking consciously about how the digital development is progressing but rather just find themselves satisfied with the previously learnt and existing ways; they may well have other things on their daily schedule to focus on rather than learning new digital ways. On the other hand, when informed or as the opportunity presents itself, the comment reveals that users have the initiative to change their ways and adopt new methods of doing things

with the expectation that the novelty is more useful than the previously learned habits. The interest and motivation define much about the users' perception of existing opportunities, which is why things' design should also present its functionalities in as detectable and trustworthy a manner as possible (see Evardsson et al. 2006:3 and Norman 2013: 32–36 in Chapter 2.6).

5.2.3   The appearance of digitalization

So far, the analysis has presented how the environment is perceived from the perspective of residents living in the area and how they find digital transformation serves their needs. Similarly, the perception of the Organizational Jury's participants is drawn from their organizational surrounding. This section points out some further considerations that need attention while implementing and utilizing novel digital artifacts and solutions. For the solution or the service to be perceived as usable and functional, the implementation requires some thought about making the design characteristics accessible and inviting to the users (see Norman 2013; Zagel & Bodendorf 2012). The attractiveness of the digital affordance is formed by the factors that the observing person finds appealing. Therefore, the quality is found to be highly subjective, but nevertheless the desired functionality should transmit to the users. (This topic was discussed in greater depth in Chapter 3.4: The creation and co-creation of digital affordances.)

Along with the developing technologies, the societal scenery is also changing, which requires adaptability from people and a certain creativity from the development design team to respond to people's desires (see Chapter 2.6.3). As is evident from the discussion, not all the changes are accepted happily, but at times the novel methods can be accepted with ease, at least when the form factor makes it easy for the new user.

> *"The development is guiding people, at least partly. Not everyone is still willing. It is the same with electronic magazines, that some do still absolutely want that paper magazine."* (DCL3G2P3)

> *"It is so that if the paper magazine ends. At least I do not like that electronic paper."* (DCL3G2P1)

> *"But wife took that first book to a tablet, with the feeling of experiencing it. And then I asked afterwards that have you read it already? Yes, I read it. Well, how did you like it? Yes, it felt good to read."* (DCL3G2P7)

> *"I'm reading books from a mobile phone. So, you do get used to it"*
> (DCL3G2P3)

Digitalization can also function as a gateway to introducing nature's offerings to people, and in an unexpected way cause more people to enjoy an outdoors life. The *Pokémon Go* mobile application was mentioned as a solution doing just that. *Pokémon Go* attracts people to get outside as they are playing the game and introduces the area and provides exercise for them at the same time (DCL1G1). In light of this observation, the digital artifacts and their design can have a surprising effect on people. However, as with any new thing the novel solutions come with a learning curve. Just like the *Pokémon Go* application unexpectedly took people outside for a walk, other digital means are introducing many new things to learn that also interfere with people's behavior. Digitalization creates new needs and thus provides new, previously-unheard-of professions at the same time as stressing existing professions with new approaches that become a part of the new requirement for the job.

> *"When teachers are chosen, there need also to be those who can manage all the IT and digitalization."* (DCL3G2P4)

> *"Yes, now that they are hiring to schools, it had huge chunk of money put aside so that schools will have these digital godparents, who coach the teachers."* (DCL3G2P3)

The expanding learning curve is something that reaches people and employees in multiple professions, in all the disciplines that digitalization affects as well as the ones it creates. The impact reaches from teachers to public administrators, as Dunleavy et al. (2005) make clear (see Chapter 2.6.2). However, as the utilized research methodology has proven so far in its recorded conversations, the community aspect can promote effective learning through participatory and mutual learning methods (Kyng 1991: Joshi & Bratteteig 2016; Bødker & Halskov 2012).

The Organizational Jury suggested how work can have certain qualities that mean that the digitalization of the processes does not create a positively perceived impact. The diversity of different digital systems in use was tiring and caused a certain level of frustration toward the computer software. Even though the work itself involves a lot of daily documenting and scheduling, the ICT aspect did not help the situation. In fact, having to learn multiple programs to reserve facilities, schedule meetings, and document visits has a negative impact on the work.

> *"I have such a feeling as an employee, that I don't have any patience*
> *for any extra programs that I would be required to learn and use."*
> (OJD2G1P2)

On the other hand, certain systems offered a very useful functional experience, as the straightforward example of emails for information sharing and communication showed (OJD2G1P2). Increased communication was generally something that was hoped for from the customer side, as information about daily activities and patient wellbeing were said to bring a huge comfort to family and friends, and a functional secured digital information platform could easily do that.

> *"In a sense that type of minor information sharing. That you would*
> *hear from your child, as a mother I was sharing the info to the siblings*
> *and other family. That way many would have gotten that secure feel-*
> *ing with ease."* (OJD2G1P5)

Taking from this example, information management where digitalization has a major impact on sharing and communication is something that appears both as a large-scale and small-scale affecter of people (see Chapter 2.4). As the digital means provide benefits for people and societies, there are some things that they are taking away from people, or at least changing in a comprehensive way. For example, remote locations create challenges for primary school pupils, who are then forced to commute long distances daily for their education. Digitalization possibilities of remote teaching and participation were seen to provide solutions to the problem, but as was then rightfully pointed out, an important socializing factor would then be taken away from young children. Even digitalization could prevent the kids having to travel dozens of kilometers every day, the absence of face-to-face social interaction was seen as unacceptable.

> *"In my opinion, it does not work with the young ones; it might with*
> *high school students, but the younger students need that, they need*
> *still to learn socializing with others."* (DCL3G1P5)

It has been seen that the success of digital transformation requires attention to be paid to many things and the consideration of multiple perspectives. Each solution should be seen holistically, in terms of what are they offering but also how they affect things overall (see Munno & Nabatchi 2014; Cohen & Fung 2004; Senge 1991). The effects can lead to fundamental changes in people's behaviors and values that require new considerations and adjustment to the changed situation.

> *"But the key issue is that we need to get those families with children*
> *and people to move into the towns"* (DCL3G1P6)

"That is a challenge, for sure" (DCL3G1P1)

"Otherwise, there is no need for the services. I would think that those schools would be built, even new ones, that is not the problem." (DCL3G1P6)

"Yes, the families are not coming since there is no schools, they do not have the trust and courage to invest here." (DCL3G1P3)

"Yes, exactly we should have the electronic services in that kind of a shape that we could without a doubt say that those will be provided for you." (DCL3G1P6)

"… You need to be quite open minded in order to go for it." (DCL3G1P3)

The attribute of trust is prominent in this conversation, and the value can be detected as a requirement in digital development in multiple ways. The effects of digitalization rely on the promised functionalities and advances compared to the previous situation, which places pressure for the development to deliver the desired outcomes. But as the outcomes depend on developmental execution, their functionality and worthiness are also evaluated from the user's perspective, which ultimately defines their success. Functionality, trustworthiness, and usefulness are attributes not just of the provided service or function, but also the digital creation itself. Overall, the development contains many moving parts and thus requires a substantial amount of trust in the organizer, the technologies, and the future developmental direction. It is, as one participant put it, a leap of faith.

5.2.4   Expectations and lifestyle

As has become obvious from the conversations, the expanding digitalization affects people's lives in multiple ways, whether it presents itself in a requirement to learn new skills, offers ways to discover new opportunities or leads to the desire to adjust life goals ahead of the changing surroundings. These observed effects spread to all areas reached by digitalization. The current chapter on the expectations and lifestyle, as well as the changing habits and the usability and functionality aspects of digitalization, present the user-perceived effects and requirements for digital development that also appear among the developed applications and ideas in the final part of the findings in Chapter 5.3.

The current topic deserves careful consideration, as the expectations and effects on lifestyle define much of how the digital services would be welcomed. The perception of digitalization was rightfully understood as providing services and

operations for people and for organizational use in diverse ways, as the breadth of different topics showcases. One recognizable expectation was that digitalization would reform the platform of services and product offerings in a comprehensive way, which is in line with the theoretical perspective found in Chapter 2.6.2. The current methods of operating different service or organizational processes were expected to overtaken by their digital counterparts. One DC group (DCL2G1) expressed how digitalization will replace current services—a transition libraries are already confronting. Their previous way of functioning is changing toward the digitalized services (i.e., with eBooks and the overall operation of libraries). Other industries face similar shocks: Uber competes with traditional taxi services by using a totally new approach.

The attraction of digital means comes from the freedom they can enable (see, for example, Nelson, Jarrahi & Thomson 2017; Bajer 2107; Rochet, Keramidis & Bout 2008). Small things matter in people's lives: for example, digital broadcasting can provide better solutions and more pleasing ways and times to consume television programs and other media.

> *"You can go as you please and then watch whenever and whatever you want."* (DCL2G1P6)

The television example it is just one within many showing how the digitalization of services awakens new hopes and bring expectations for better control over time and task management. In the matter of health care, time is of the essence and a new way of organizing work can bring better and more varied results.

> *"Digitalization helps at its best here at the countryside, so that at our health center ... we figure out how to free the doctor's time, so that he has time for other things."* (DCL1G2P1)

Even if digitalization offers novel methods that create more opportunities for people to use their time more effectively and pleasantly, the novelty also means that digital functions have come to replace current methods, affecting at least momentary consequences of the expected effects of digitalization (see chapter 2.5). The change is noticed by the participants, as they mention (for example) Uber taxi services and changing accommodation services like AirBNB, where people utilize other people's homes for their traveling purposes. These solutions are enabled by the digitalized society and can be seen as an answer to a demand, as one participant commented:

> *"It is noticeable that these transportation arrangements reflect the present day needs and that they work. ... Then this hotel ... it is*

starting to show in the overnight stays … This kind of a thing, it just comes like we'll Uber taxi, they just came. There will be some court cases, but they will just arrive for the use. And then they just somehow fit into the law regulations." (DCL2G1P4)

According to the expectations, digitalization is bringing novel approaches that are expected to bring time savings by introducing new methods of thinking and doing. But it also became apparent that digital ways are going to face some resistance, most noticeably on the public administration side of things, as it was mentioned that the first concrete development ideas should dismantle bureaucratic behavior.

"Surely, what should be done in concrete, would be to dismantle the bureaucracy and norms" (DCL2G1P8)

Bureaucracy is not recognized as the only restriction. Participants also expressed their worry for the everyday people when accessing the digital tools required user resources as well as know-how concerning the electronic services. Even though digital services have already come a long way, and electronic service solutions are found in bureaucratic institutions like the police and the tax office (among others), the participants still emphasized how a large group of people might be at risk of not being able to connect with online tools. The exclusion presents a variety of pitfalls that challenge engagement with the services. As a result, a large group of people might fall out of the services and require a lot of attention and education to stay connected with the changes.

For this reason, the participatory design approach engages marginal or polarizing groups or people to co-create solutions, as Vines et al. (2013: 430) advocated. Banking services provide a good example of how an industry is pushing services online. The benefits for some were recognized by the participants, but the change also caused worry and frustration.

"Nordea (bank) is quite difficult to visit, it is open for half a day once a week." (DCL3G1P3)

"And then you do not even get cash from banks, even if it is open. That is unbelievable." (DCL3G1P6)

The discussion acknowledges a broad scope of challenges that needs to be solved before a totally unproblematic execution of digital services can be provided for a large and diverse user base. Digital development also includes polarized opinions, not only on controversial topics but regarding the technologies as well.

Participants, for example, expressed the worry that comes along with changes but also demanded faster action from the bureaucrats to get progress going.

> *"Exactly we are hiding behind the regulation, why can't we push back a little bit and break the rules"* (DCL3G1P6)

> *"We should quickly put a testing scenario in motion, and maybe on a smaller scale. With people who would dare to try out the whole thing."* (DCL3G1P2)

Digital change particularly tests public administration rules and regulations, where the bureaucratic processes and regulations protect for example privacy and justice for the citizens. Private businesses operate more easily on digital platforms, where the control is more handed over to the customer (see Chapter 2.6) As the DC group recognized, social media users, for example, give up some individual privacy when accepting to use the service. Again, use comes with benefits and disadvantages, as the solutions can promote greater openness and transparency but require a conscious knowledge about the existing disadvantages and risks.

> *"When I signed up to Facebook, have to say I thought of it twice that damn what could I write here but I have noticed that when you write it yourself, and do it openly it enriches life, and nothing is taken away from you."* (DCL3G1P1)

Digitalization was recognized as bringing novelties to almost all areas of life and work, and as such the change also demands a lot of adjusting for people to keep up with the changing ways and remain safe from potential harms. The digitalization itself seemed like a concept that will not wait: the transformation will happen even without a fully tested operating environment. The technological development itself and the ways users adopt the digital solutions proves this point to be true, and demonstrate how digitalization's quality as an easy testing environment actually supports this adoption of new methods. People just need to be ready and accepting to constantly alter their behavior. It is also important to remember and be motivated to concentrate on the core issue driving development and not to get sucked into development only for digitalization reasons. However good an idea might seem otherwise, it *must* serve the required purpose.

> *"I would agree fully this idea we only have one problem with it, that we don't have the people to for utilizing the service. The initial purpose for digitalization should be that we could get people and residents here."* (DCL2G2P2)

5.2.5   Changing habits

The previous section revealed that people have started to favor services according to their own time- and place-related expectations. In this manner, control is also shifting more towards the consumer (see Chapter 2.52).

> *"Digitalization has modified the ways in which entertainment is being consumed. Nowadays, the consumers' schedules are not defined by the broadcast network."* (DCL1G1P3)

The expectations are not restricted only to entertainment. The demand of an individualistic approach extends to services and other areas of digitalization. As one group member (DCL3G2P7) suggested, the evolving technology enables personalized content offerings that can be customized according to individual needs. For the elderly this could provide an introduction of familiar faces to remind them about the time, date and daily schedules and other activities that help people with a memory disorder to cope with everyday life. This example was given in the DC conversation. Without delving too deeply into the theme of globalization, technological progress is surely pushing the opening of the world, as people can find their distributor, their customer and social interaction etc. quite freely among the global markets (see Chapter 2.6.2). In this manner, a shortage of local production does not necessarily affect the average consumer but guides their activity in new directions, which was a noticed effect among the DC group.

> *"If I want some ecological foods, I will go the local producer and order larger quantity at once. If the larger grocery store is not interested I will buy where I can."* (DCL2G1P9)

The change of behavior happens constantly as new technologies are introduced and people adopt them. That said, people are still occasionally keen to retain already-familiar consuming habits and interaction methods, like for example reading books printed on paper.

> *"At least, I don't want to read a novel as an e-book, I just don't want to. Otherwise, I like to read things from the Internet but not a novel."* (DCL1G1P2)

> *"I cannot ever imagine that books will ever become totally electronic. People do still want to have that version that they can touch and feel."* (DCL1G1P4)

The insight is meaningful as it presents different values that can accrue around the simple experience of reading. Reading can appear as a function that provides fast

access to the source of required information, or it can reflect a way to relax and escape an otherwise busy life schedule. Again, the design of the service needs to be crafted with the intention of the offering and the target user group's desires in mind, so an e-book might still be able meet the desires of the people as long as the content is crafted to meet their wishes (see Norman 2013). The virtuality introduces an element to services that would not otherwise be possible to include. The new element of virtual reality can operate as a tandem feature alongside traditional techniques, as in the case of navigation.

> *"As a matter of fact, now that you said it, I have used Google Maps so that among other ways, that before coming here I checked this place from the Street view. And if we are going somewhere abroad, I'm checking the area that there is that cafeteria, that you already have a view about the place before entering there."* (DCL3G1P1)

In this example, the person was able to secure his arrival at the meeting place in advance by learning what to look for from the destination location. The side-by-side functioning virtual reality provides added value to the experience, but the virtual element can also function as a standalone value, as it did for the participants taking advantage of the virtual reality opportunities in travelling and tourism.

> *"Yet again about this tourism, that what opportunities it would open up. Why wouldn't we bring virtually some German war veterans to observe the Raate road (Raatteentie), they would be there with some virtual helmets on. … Tampere has the Moomin museum. There would be Moomin exhibition, so why wouldn't we take the kids there virtually to see the exhibition. So that they do not have to travel. But that we could produce cultural services through virtuality, there would some guide with a helmet in his head providing an introduction …"* (DCL3G1P6)

In addition to the added features and time-saving that digitalization could bring, it was also considered to introduce cost savings, as it requires less travelling for people to take part in different seminars, concerts, or exhibitions. It would also provide better access due to circumventing existing time and place limitations. The example of a visit to Madame Tussaud's, the London waxwork museum, was mentioned. Digitalization appears as the novel means of delivering people's requested offerings, whether it happens to be the broadcasting of a television show; meeting transportation and travelling needs; broadening the selection of goods, services, and products; or simply introducing new experiences or new ways of experiencing things.

Similarly, in both the Digital Café and Organizational Jury instances, the rearrangement of work processes was perceived to bring time and cost savings, but at the same time as the work methods changed, new learning requirements would have to be introduced to the employees. Within the organizational development the OJ members recognized how functional digitalization practices can be absorbed from other work environments. A solution using the Wilma application was suggested from the school surrounding for the time and task management challenges of the hospital organization.

> *There is this electric notebook Wilma, in between home and school. That would be an awesome tool here as well. We would be suggesting suitable times for you to choose."* (OJD1G1P1).

In a follow-up conversation, the participants also recognized possible information security threats with an electronic messaging system. This might not appear as such a sensitive issue in the school environment but among health services personal data are strictly protected by the law. Despite the laws and regulations, the participants argued that the laws and regulations would probably be able to take the information aspect into consideration with the digital means.

The digital technology was recognized as offering ease of use for the much-needed communication among the services. The suggestion rises from a customer perspective, one of whom had noticed the need for more effective and convenient handling of the expanding paper and letter flow during the care process.

> *"Honestly from a caregiver perspective it is very important, it is unbelievable how much paper you need to fill in. Before, after, and now again one long letter came to be filled after the ward period. ... when you have it* [the digital platform] *everything is found easily in one place. Specifically for parents, very handy."* (OJD2G2P4)

The suggestion continued with the same Wilma example from the school context. The insight also gathered employee acceptance as a good way to communicate and manage the increasing paper flow coming from the service interaction. By this, digitalization was recognized as making an impact also on the ecological side of services.

> *"Should also be a paperless hospital."* (OJD2G2P1)

The suggestion about the digital communication platform also carried certain hesitations and reservations. The same issue was discussed in another group, where it earned some skepticism regarding its real-world functionality.

"So, you are quite hesitant toward the functionality of that kind of a system?" (OJD2G1Facilitator)

"Yes, at least with that reality where I live in" (OJD2G1P2)

"I don't fully comprehend how it would happen." (OJD2G2P2)

"I don't feel strongly towards it one way or another. It could be good if it works, and it is not just one more system that requires work and does not function well." (OJD2G1P1)

The hesitation expresses doubt and a lack of trust in the software's ability to manage complicated reservations and scheduling. But it also demonstrates the diverse perspectives and opinions that one solution can include. Considering the capabilities of technology, it can safely be assumed that the digital solutions would be able to manage the abovementioned issues (see Chapter 2.4.2). Of course, any hesitation or doubt from the user perspective represents a valued insight precisely because these are the aspects that need to be recognized, learned, and solved in order to create and integrate functional solutions. The digital transformation was seen to introduce noticeable changes in people's lives, mostly due to the changing digital environment and the changes to operations. Along with the introduction of novel digital approaches, it is also worth investigating the perceptions and expectations of the usability and functionality aspects of digitalization, as the connection between the digital medium and the user might not consider correctly all the aspects of the interaction that the theoretical and empirical observation above was able to present.

5.2.6   The usability and functionality aspects of digitalization

Among all the creativity of producing new digital artifacts and content for users to consume and utilize, the ultimate necessity is the aspect of functionality and usability (see Norman 2013: 32–36; Volkoff & Strong 2013: 821–822; Lanzolla & Anderson 2008: 73; Kramer, Noronha & Vergo 2000: 46). This is something raised in the DC conversations. One participant mentioned that an otherwise-desirable idea or device easily causes more frustration than appreciation if the functionality aspect is not considered correctly.

"I have to state that it is so, that technology should appear as the slave, the entity that enables, and not the one that demands us to adjust our behavior according to the technology functionalities. If so, it does create problems and irritation and we already have two laptops that

have been thrown away due to that irritation. The most annoying fac-
tors are dysfunctional devices and problematic programs."
(DCL3G1P6)

The learning curve is something that comes up again, which is unsurprising since it is easy to understand people having different levels of technical skills, interest or even resources for use of the digital artifacts. For these various reasons the usability of the novel digital methods might appear too challenging to some, so they might prefer to miss the opportunities that digitalization can offer rather than learn new ways. This too was suggested in the DC group.

"There lies the prejudice toward the technology when you are not fully
aware what does all of it contain and the change is the biggest thing."
(DCL2G2P1)

The prejudice and misconceptions that relate to the adoption of technologies affect people's minds; even the choice of terminology can promote or inhibit the adaptation to digitalization (see mental models from Mumford et al. 2012; Uitdewilligen, Waller & Pitariu 2013; Senge 1992 and Johnson-Laird 1983; and cognitive flexibility from Diamond 2013).

"The difficulty is acknowledged and has always been of course that
for certain age groups you should not talk about computers, but the
systems should be something totally different. Like you said with
touch interface and such." (DCL2G2P1)

The technological devices and solutions seem to have this characteristic, that their appearance causes suspicion in people. The doubt can be a result of many things, as the elements of the digital medium (Chapter 2.1) introduced. The concept is made complex by the variety of intended uses, while the challenge of actual use might appear intimidating to some. These features can end up resulting in prejudice, where even a wrong choice of words sets the interaction on a wrong path.

"The way digitalization has been objected-to—and it is clear that it is
objected-to—we need to change the dialogue on how to talk about it
and refer them as supporting devices." (DCL2G2P3)

"Yes, you cannot use the word computer at all." (DCL2G2P1)

Despite the apparent negative connotations of computer technologies, the solution for successful introduction was said to come from the use of a suitable terminology that removes the technology-related jargon that the field of technology is often guilty of. Using language that users can understand helps to transmit the meaning

of digital devices to them. At the same time, better understandings decrease the fear of utilizing the technologies (L2G2P3). The joy of using the devices and solutions was something that comes as a demand from the user perspective but should also be set as a developmental target, in order to decrease the resistance against them.

> *"Everything should be fun; everything that we do should be pleasant and easy to use."* (DCL2G2P4)

The mobile application *Pokémon Go* was used as an example of successful creation as it emerged as a fun and inspiring software solution that ended up impacting people's behavior and having surprising health-related consequences. The users walked long distances as they followed the game's directions. The *Pokémon Go* application shows a creative way in which people can socialize and exercise, resulting in positive health-related outcomes. The example shows how the ease of use, fun and attractive execution of a digital artifact or solution can affect people's well-being but also become popular among user groups that are not naturally attracted to them.

> *"Many 70-year-olds are already on Facebook. They could easily learn to use those touch interfaces and utilize bank or doctor services or find the way to order food. It is these two things, easiness and fun of use, and adding attractiveness it forms out of those."* (DCL2G2P4)

As people mentioned, to appreciate an intuitive use of and interaction with the digital devices their usability and functionality aspects can be addressed in design choices that target the desired user groups' interests, as Chapter 2.6.3 explains. One example the DC group highlighted was how the solutions need to attract users with their ease-of-use to overcome barriers caused by the existing lack of interest and motivation toward the technological solutions among the elderly population.

> *"There is a lack of willingness and interest to learn new methods. The access to the services needs to be made so easy that you don't always have to open a computer to access them. Rather approach something tangible, like touch screen to interact with the services that grants the access to the nurse, to pharmacy, etc."* (DCL2G2P3)

Digitalization involves numerous aspects that influence people's perceptions, as this conversation has proven. The fact that there are many generations and people who simply do not know how to use a computer or do not have a computer, as one member (DCL1G1P3) expressed, proves why appearance and design matter. The inhibiting factors can be caused by many things, such as people lacking the abilities

and skills to pay invoices, not having access to digital content and generally preferring to meet people in person for the sake of socializing, the member continued. In these cases, digitalization raises the fear and risk of social isolation and marginalization within certain target groups, as suggested by Haenlein and Kaplan (2019). But even with the required abilities and skills, the network connectivity and infrastructural requirements are the deciding factors, creating the ultimate demand and either an obstacle or access to functionalities.

> *"... there is the world's worse internet connection, you are not even able to use your mobile phone, and don't have access to the Internet, so there is no chance on earth to use any of the digital service offering."* (DCL1G1P2)

It became clear that the use of technology enables certain tasks that can be finished quickly and easily through online services, and it also enables the easy scheduling of appointments and finding of information and assistance. Digitalization was even recognized as a welcome approach for health services, where a solution such as remotely connecting with a doctor or a nurse can even enhance the delivery of care, as the findings conclude.

> *"It was a very good service and response when I sent a picture of my grandmothers skin problem, who lived far away from our doctor who was able to diagnose it at a distance and provide a phone description for the care."* (DCL1G2P1)

At this point the meaning of a reliably operating and trustworthy Internet connection appears once again as the vital point for the functionality of the services, and the data connectivity has earned a necessary status in people's minds.

> *"The network connection should be like a refrigerator: every household has one."* (DCL1G1P4)

The Internet and technology reliability considerations have expanded to almost all areas of life and work (see Bødker 2016; Croon Fors 2010; Negroponte 1995), as the discussions and example of modern agriculture also demonstrated. The necessity of data connectivity for modern farms has become as important as water and electricity, as was mentioned within one group (DCL1G2P5). Robotic barns require a data connection to function, and in this sense cybersecurity was also noted by the same participant as one of the most important aspects of modern farming. The example clearly brings the necessity of network connectivity on par with the metaphor of the refrigerator, as mentioned above. The solid Internet connection was considered essential to building the reliability of work and services. Its ubiquity might also help to familiarize digital means for people, as the fear and neglect of

the technology appears still very strong among the population. Mass informing about digitalization might be key to breaking down barriers, as the following comment suggests:

> *"Even if the computers are developing all the time to be more user-friendly the elderly people are not used to that development. It creates a great barrier toward the digital services."* (DCL1G2P1)

> *"There are a lot of people for whom the technology forms an obstacle, so there would be many things that they might feel that technology could enable, but the lack of skills and know-how toward digitalization keep them away from it."* (DCL1G2P1)

Prejudice or lack of interest is also not only an issue among the elderly population: it was recognized among working-aged people in the OJ conversations. As the perception was that the digital technology is acting in a demanding role, the outcome should be that the solutions need to be designed to function more intuitively, and without unnecessary features or steps in use. Greater usability might also help to motivate people who are not so technologically oriented to use the solutions. Chapter 2.6.4 provides an insight into these kinds of issues, where a design could impact on a problem that was considered to be caused by something else, like a lack of knowledge. Design choices can help provide answers to possible problems even if they appear ambiguously, as sometimes the solutions are usable even if the user does not fully understand all their mechanisms.

> *"I guess it could be said that the less you use and understand the topic of digitalization, it feels that you're digging the soil underneath your own feet. That I guess it would remain better in the assistant role when you know more about it."* (OJD1G2P5)

This thought gained support from the other members and the participant also admitted that the topic of digitalization should be addressed more, as it is here to stay. In addition to that, digitalization has a strong role in the lives of the children who are the clinic's patients. This user perception is also undoubtedly true, but it misses the possibility of different kinds of engineered solutions.

During the DC conversations it become clear that the participants expected the surroundings and the services to become more and more digital. A similar expectation was expressed within the OJ as well. Digitalization was seen to provide access to opportunities and features that were previously unreachable within the region. For example, digitalization could provide access to experiences in the area without the need for physical presence, as people could search online for different

locations, attractions, and services; watch bird cameras; and search for other activity options (DCL2G1P4). The participant went on to say that the method of presenting things needs to be thoughtful, so that it can present the options as being creative and visually appealing, so as to attract greater interest.

The opportunities and gains offered by digitalization are undoubtably recognized among the development groups, but within the DC groups executive and operational management seemed to present constraints rather than enabling actions for digital development. The DC participants expressed on multiple occasions how public bureaucracy seems to be neglecting future developments, if not outright inhibiting the digitalization process.

> *"The bureaucratic procedures within agriculture must have doubled or tripled over the years despite the bureaucracy promising reductions. We are waiting with interest to see what the current promises mean."* (DCL2G1P9)

The legislative perspective was brought up as a restrictive issue for many novel and desired ideas. As the participants were considering reforming of the taxi services with stronger customer orientation, the idea confronted skepticism regarding the legislative view:

> *"Well, some law will definitely come in between."* (DCL2G1P5)

As services become more and more digital, the usability and functionality perspective on them gains participants' acceptance. The need to rely on electronic services causes nervousness when dysfunctional digital solutions are feared to make service interaction difficult. Digital services are hoped and expected to work fluently and easily, so that people can concentrate on other, more meaningful duties, as Castells (2010: 69–76) expressed in other words about the information technology paradigm. It could be interpreted from the participants' perception that the lag in personal service interaction within the digital services takes something away from existing services when the new solution is also demanded to function flawlessly, without losing any other features from the quality of the service.

As electronic services have sign-in and log-in requirements, one usability aspect related to password security and facility of use caused some discussion. And in general, the necessity to log in and remember different passwords was acknowledged as a challenge and a restricting issue in the use of e-services. Suggested solutions came from the banking world and included using facial recognition technology and a common electronic identification card solution (DCL3G1), but the suggestions remained devoid of clear mutual agreement.

> *"These issues need to be made visible, these benefits for the businesses
> and for the people. People's experiences who do remote work and the
> experiences of the companies, they need to meet each other."*
> (DCL3G1P6)

The discussions prove how the use of digitalization introduces multiple perspectives on how people wish to use the developing technology, and these views often present opposing forces that come to restrict development. Consequently, the observations note that the issues should be approached via collaboration that addresses the perspectives, as the following paragraphs demonstrate.

One technology-orientated participant revealed an issue of great importance for the usability and functionality of the digital solutions, as he has created a way to remotely interacting with an older family member.

> *"If we consider a senior citizen, there are two issues. Firstly, how to
> support easier living for the elderly, and secondly, how do we support
> the person acting as the remote family care giver. And these are two
> clearly separate issues."* (DCL3G2P7)

When considering the example of remote care solutions for elderly people, what becomes clear from the conversation is that the whole scenario needs to be considered holistically. In the development of a technology-supported system, the functionality and usability aspects of the technology needs to be considered from each user's perspective. The trusted functioning of the devices, but also all the non-technological aspects of the service, such as who comes to open doors in a case on an emergency, who to contact in the need of a personal visit, etc., were also matters raised (DCL3G2). The notion stresses the meaning of viewing the digital solutions' functionalities and features from the user perspective and highlights how there are always multiple approaches attached even to a single solution, as Bygstad et al. (2016: 87-88) explained.

5.3   The digitalization of artifacts, services, and solutions

While evaluating the usefulness and desirability of digitalization, the participants became creative in innovating desirable digital solutions either for the organizational processes (OJ) or for the regional needs (DC). The developmental intention aimed to produce usable digital solutions within the target context, where the user-centered approach supported the legitimacy, functionality, and desirability of the designed solutions. As shown in the previous sections, the ongoing digital transformation provides an intriguing arena for any development, and the insights

expand greatly when exploring the users' perceptions of the desires and opinions regarding the utilization of digitalization.

During the conversations, digitalization was described as the "only way forward" (DCL2G2P1) and as something that provides the means to "make things easier and wiser" (DCL2G2P4), so the concept can be said to be filled with hopeful expectations. During the process, the participants were given explicit freedom to imagine their surroundings as they would wish them to be and equipped with digital means that they considered necessary and desirable. Even though the majority of the findings have come from the Citizen Café observations, the Organizational Jury process also drew heavily on digital development as part of their organizational development. The OJ report presenting the process outcomes produced 12 development suggestions (see Niemi et al. 2017), 11 of which involve the presence of digitalization either directly or indirectly.

The Organizational Jury development suggestions were divided into five categories: access to care; customer orientation and collaboration; technology for the support of care and collaboration; facilities and the operating environment; and finally continuity. The twelve development suggestions are briefly described in the report, and the descriptions or the conversations around the topic revealed the close relation of digitalization to most of the suggestions. Only the suggestion dealing with work clothes can considered technologically irrelevant; some aspect of digitalization is applicable to everything else. Digitalization becomes visible in the aspects of access, information, and collaboration; in digital artifacts and solutions; and in the opportunities relating to the facilities and operating environment. These attributes relate strongly to the spectrum of services identified in the research conversations. The appearance of the OJ developmental suggestions becomes apparent in the following subchapters, where the conversation ideas are collated into the subchapters introduced below.

In discussing digital affordances, the conversations branched in multiple directions, as the conversations were not restricted in any way. The discussion between the participants were merely moderated by the research team facilitators to allow time for everyone to speak and to keep the conversations either within the Digital Café or Organizational Jury contexts. The approach enabled the discussion topics to come from the users' interests, so that they had the chance to express their approach to digitalization's opportunities and disadvantages. The overall findings related to the digital artifacts, services, and solutions were arranged during the analysis process and structured under the following categories:

- The impact on work
- Study and education

- Smart technology
- Health care and wellbeing
- Travel and tourism
- The digital ecosystem

The findings present a variety of digitalization-related solutions about which the participants expressed their subjective thoughts and experiences but about which they were also influenced by the other group members' opinions. The categories represent topics that the participants considered meaningful to their aims and desires, and as such the results reflect how the users perceive digital affordances. The following subchapter provides a short introduction to the general view on the range of suggestions influenced by digitalization.

5.3.1 The spectrum of ideas

Just as the demands and promising attributes related to digital transformation branched out in diverse directions, so too do the users' innovations for creating digital service and product solutions. Due to the extent of their suggestions, it is appropriate to start by collating the findings and presenting a general view of the direction of the development suggestions. The discussions were enthusiastic, which reflects a good commitment towards or interest in the topic, or ideally both. The atmosphere supported collaboration and helped to produce a variety of ideas regarding different uses among the following areas:

- information management, sharing and interaction,
- work-related ideas and strategies enabled by the online market and digital opportunities
- safety, wellbeing, and leisure activities enabled by digitalization

The ideas, suggestions, and imagination that the groups offered responded well with the issue of how the participant perceived their environment, in both its positive and negative aspects. Like the dilemma of the distant location, the DC conversations mentioned bringing different kinds of shows and seminars closer to people by broadcasting them online. This could happen either individually for people on personal computers or even as organized gatherings for online seminars that would provide people with a sense of belonging and social interaction. In one example, the group mentioned how local theaters could be utilized for broadcasting different kinds of content.

"Like in a local movie theater something could be organized live, something like some big concert that would be happening at the same time somewhere else." (DCL1G2P3)

Regarding online events, the members felt that technology is no longer a constraint.

"It was as a matter of fact in 2007 the desire that the church ceremonies from Iivantiira could be broadcasted here as live session came up. So, we have been thinking about these for ten years. Now would be the time, the network is up and running and it would be possible." (DCL3G2P6)

Chapter 2.4, 'Understanding digitalization: the evolution of digital progress,' portrays the lengthy journey of technological development, which is also something that becomes apparent from the discussions. Transformation requires multiple factors being appropriate to their surroundings for the effects to become possible and successful, even if the idea has been out there for some time. As Norman (2011) presented in *Living With Complexity*, digitalization creates a complex environment around its functionalities, which creates the ecology of artifacts that requires many of the multidimensional attributes related to the technology to connect and function together for successful use. As Bødker & Klokmose (2011: 321–322), Vasiliou, Ioannou & Zaphiris (2015: 59–60), and Jung, Stolterman, Ryan, Thompson & Siegel (2008: 201), all quoted in Chapter 2.5.1., explained, the interconnectivity of things emphasizes the connectivity requirement between the artifacts, the users and within the temporal and physical spaces. As the example from the participant above proves, many things need to align for the development to take place.

Library services were something that was recognized as responding well to the challenge of distance: one group, following one member's lead, described the library as functioning as a digitalization pioneer. Many of their services and systems represent novel digital approaches. Among their digital systems, libraries offer a lot of digital content as magazines, books, and newspapers for their customers (DCL1G1P4). The existing availability of digital content, like journals, books and magazines has become known, which then increases the interest and demand for them.

"You as university people know that you could go to whichever university's library to acquire material. The same way we could have a yearly license for ordering whatever electronic book. So, you could read when you feel like it and have the time for it." (DCL2G1P9)

The visibility of the digital creations and offerings was a factor mentioned in the conversations as promoting the use of digitalization, but also decreasing the resistance against the change (see Chapter 5.2.6). Among the digital offerings, the balance of supply and demand is critical: as some approaches prove themselves productive or functional, the demand for them increases, which also creates new business approaches around them. Digitalization was recognized to create diverse opportunities connecting to the already-found solutions. For example, as business and sales are moving towards online sales, one idea is to have the logistics be centralized like a hub of web shops to achieve greater benefit from the existing markets.

> *"Relating to business, what would be good. We have been talking about web sales, distant locations and concentrating on online sales and especially as we are here next to the Russian border, the distribution is directed toward Russia. … It would bring opportunities here, to the whole east border since we could centralize web shop locations here. Web shop, type of logistic hubs, from which the delivery of goods would start immediately. So anyway, instead of good connections you also need the contract for it. Since now it just doesn't work."* (DCL2G2P9)

All in all, the business models are changing as the processes become digitalized. Entrepreneurs have become dependent on their Internet connection, as trade has moved online, which brings benefits and opportunities but also the demands of infrastructure and necessary know-how.

> *"You don't need to have the goods here, that storage can be wherever in the world. You will take the orders and distribute them forward and that's how it goes. That lady, she was distributing Karelian pies in huge loads, Karelian pies coming from Nurmes to Helsinki through online sales. It was a substantial business for here, distributing Karelian pies."* (DCL2G2P1)

The thought of expanding the known idea of pizza delivery to a larger distribution of foods, also represent a new business model that expands from an already existing idea to greater volumes. With the aid of digitalization, the countryside could also start expecting for more variety of services, even though the face-to-face services are disappearing.

> *"The thought of a pizza taxi* [sic] *could expand to its own business model, where an entrepreneur of food delivery could take charge of delivering foods for elderly people in the distant countryside."* (DCL1G2P5)

The idea represents a business model that for example Wolt and Foodora, etc., have come to practice in the current market, which shows that creative ideas are often not unique but successful variations on previously functioning solutions (see Pearson & Sommer 2011). By seeing old scenarios in a new way, the digital transformation was perceived to be evolving the currently functioning operations in novel ways (see Pearson & Sommar 2011: 29), like the development from cashiers to self-service checkouts that ultimately function without the need for personal customer service. As another example, 3D-printing technology could restore local production back to developing nations. These ideas were expressed in the group (DCL2G2P9).

The spectrum of ideas went in many directions, but within the ideas the needs of the people and locations were considered thoroughly and the insights utilized digital affordances well from the perspective of the surroundings. It was also noticeable how the ideas were positive about future development. Overall, the remarks aligned with earlier statements describing the conversations as happening in a good developmental atmosphere. Such an attitude supports good idea creation (Chapter 4.1), and the conversations also reflect trust and belief in the developing digital future. The suggestions strongly promote the liberation of work practices and expanding the means to work, and the attributes of trust, belief and freedom become apparent as perceptions of digitalization.

The following subchapters reveal the perceived affordances of digitalization in work and life.

5.3.2   The impact on work

Views on where and how digitalization could afford support and advantages focused strongly on work areas. This outcome represents a somewhat expected result, however, considering the meaning of work to the wellbeing and prosperity of an area or its surroundings, as was discovered in the findings (see for example Chapter 5.1.2). While the DC conversations expressed the desire to draw more residents to the area and the OJ focused strongly on digitalization's effects on the efficiency of work (see Chapter 5.1.3), in both, progress was described as affecting work in quite major ways. One DC member's statement supports this. They said "*I want to keep myself adequate at the work markets, want to maintain myself in this society and use all these new services. I want to execute my work more easily and more flexibly, and this way make my life easier.*" (DCL2G2P2). These views on the work-related digital transformation lead to fundamental considerations about work. For example Dunleavy et al. (2005: 468) and Meuter et al. (2005: 61)

have stated that aspects of the meaning of digitalization include significant numbers of work environment -related effects (see Chapter 2.6.2).

Digital transformation was seen to change work drastically, causing certain occupations to vanish, changing means and processes in others and creating totally new ways to make a living.

> *"Consider the job market. Traditional occupations are becoming less and less but what could we bring in along with this digitalization, new forms of jobs, new forms of workplaces. More work here."* (DCL2G1P8)

The statement closely follows the description of how the technological development has been steering the societal change and business markets (see Chapter 2.4.1) and the appreciation of individual knowledge capital and the power of knowledge work, as Drucker (1999) expressed decades ago. While the participants recognized the changing nature of the information and communication aspect, the ever-strengthening aspect of knowledge work arose in the comments. The observation about the changing work environment came from the evolving robotization of the agriculture, which directed humans away from traditional manual labor occupations.

> *"A general misconception is that the countryside is somehow behind in digital development, when in truth it's at the forefront of it. All the documentation, applications and all legislation requirements have for a long time been demanded digitally."* (DCL1G2P5)

> *"Also, all the automation within modern barns, it is pretty incredible."* (DCL1G2P2)

> *"The physical work is getting less but it has been replaced with all sorts of other work."* (DCL1G2P2)

While robotization and other advanced automation is changing the work, the most recognized desire for digitalization still came from information management. Digitalizing information and communication, with information sharing, managing and support for different kinds of collaboration, were activities where digitalization was hoped to introduce a change for the better. Along with more effective information management and remote working opportunities, the participants within the organizational environment (OJ) brought up the requirement for remote participation and collaboration in meetings. In the case of psychiatric care, the services are operated by many different experts that do not necessarily work in the

same facilities, but everyone's presence is expected in the patient meetings. The conversation addressed how digitalization can enable cost savings, but even more importantly time savings by—as one participant claimed—bringing some common sense to the meeting procedures (OJD1G1P2).

> *"We do wonder how much money it burns, when all the members of the care team are dragged in together for a meeting. There we are, sitting for an hour, and all the people change their schedules for it. Commuting is being paid and everything when the same thing could be executed with something else."* (OJD1G1P2)

"With Skype" (OJD1G1P1), another participant responded. The freedom to work and participate from anywhere at any time demonstrates the great freedom that digitalization has brought to working practices. They have experienced digital liberation as the work solutions and supporting technologies have progressed to meet the requirements of the work demands. A misconception would be that the current technological advancements are focused on digitalizing existing practices and forms of communication, even though a work-relieving suggestion from the Organizational Jury addressed just that as a part of work digitalization. The ICT aspect was also highlighted as an important aspect of future-proofing when structuring new work facilities (OJD2G2). A virtual/information wall was mentioned as one possible solution bringing an advantage to the workspace, referring to advantaged communication opportunities related to work matters.

> *"Virtual wall. Where patients' or customers' name and certain issues can be read with ease, so that you don't have to open a computer for it. That would be very handy."* (OJD1G2P2)

Within the developmental suggestions the OJ also brought up different technologies, like digital artifacts and solutions that were expected and hoped to introduce effectiveness but also quality and comfort to the work and services of the clinic's operation. The suggestions are briefly presented in the development report (see Niemi et al. 2017), but the perceptions about the suggestions are also raised later (see, for example, Chapter 5.3.5). The Organizational Jury outcomes are all ultimately work-related as the process was organized with the aim of organizational development, and as mentioned most of the final suggestions involved an element of digitalization.

The topic of remote work was already touched on above but as the issue was experienced as a major topic for the wellbeing of rural areas it deserves particular attention. In general, remote work was perceived within DC as very much depending

on the prevailing work culture and peoples' characteristics rather than the required technologies: "those we already have", one participant explained (DCL2G2P4):

> *"Previous supervisor had a positive attitude toward remote work, but after a change of supervisor the reply to remote work was: no."* (DCL2G2P4)

It is still worth remembering that while individual digitalization elements enable many of the remote working functionalities, it all depends on a working infrastructure, which demonstrates the necessity for the functional digital ecosystem (see Chapter 1.1). This was also fully acknowledged by the participants (see Chapter 5.3.7). As for the functional work infrastructure, the multi-location work surroundings can be found in numerous environments. Meeting people at the workplace has its benefits but at home one can concentrate on work wearing casual clothes and sipping coffee without losing time commuting, as one participant pointed out (DCL1G2P5).

Although remote work can provide the benefits of working freely from your preferred surroundings and according to your preferred ways, access to the digital means presents itself as the vital necessity. This does not restrict work to the home environment either: work has been recognized as drifting away from a fixed office to a more flexible mobile work manner. Even the term remote work is experiencing pressure to change as a new term could describe the change of work more accurately.

> *"It already has a term for it, it is called multi-location work, one person can work in multiple places."* (DCL2G2P4)

The work surroundings were in many ways seen as the target for the digital affordances. The conversation below presents digital development as providing for working needs.

> *"When the development of the optic fiber was announced, this concept of remote working had a strong presence in everything we marketed and did. But it just did not evolve from there … when we think of this potential we have, we are utilizing only a marginal portion of it. It is the attitude, which must be the main concern, that employers do not trust that their employees would genuinely do their work. The truth is, if you have a motivated employee at work, that person is even more effective while executing the work remotely than from some office.*" (DCL2G2P1)

> *"Remote working options are very much dependent on the employer. Ten years ago, when working for the Center for Economic Development, Transport, and Environment, you went to work, punched in, and were not allowed to exit before the clock struck 8 hours of work. Now things have changed, and more employees are enjoying the remote working option. So, since they have been able to achieve that shift in attitudes, it should be possible elsewhere as well."* (DCL2G2P8)

> *"The mentality is that if you are not visible for your supervisor, you are not working."* (DCL1G1P2)

But as can be seen, the allowances or the inhibiting factors still relate to the people around the technology and the culture you are in. The constraints can be heavily dependent on single individuals, their management attitudes, and their opinions, rather than the available technologies. Their attitude can also reflect their socio-technical competence (see Chapter 2.6.3), reminding us of the human factors within holistic digitalization. Moreover, the participants expressed this perception while stating that even if the digitalization means were acknowledged to possess qualities that support efficacy and productivity in the areas of life and work, the required knowledge and skills still need to be recognized as potential pitfalls. An example given about an interaction presents the struggles that a move toward more effective ways can present, and how in many cases success can depend on something small, like a minor change in people's previously-learnt ways.

> *"It took me three years to teach the crew to email messages to a specific address that eases my workload. It can be a challenging task to educate people to use email."* (DCL1G1P1)

The findings emphasize the socio-technical aspect of the use of technology, as presented by Mumford (2006), but over and above the direct usability of the working technologies the results indicate the attitudes related to the impact of the technologies. However, Shin (2014: 512) explains how socio-technical conflicts can be avoided and untangled through user involvement, which then presents an ability to influence peoples' attitudes, motivation, and opinions regarding the used technologies. It is still worth stressing a DC member's opinion that there will probably always be people unwilling or unable to go along with the suggested developments :

> *"I will say from strong personal experience that not all are fit for remote working."* (DCL3G1P1)

The impact of technology and specifically the holistic consideration of digitalization presented itself as a vast topic that got a lot of attention and generated a lot of conversation. As with many things in digitalization, the perception of the work-related affordances showed a lot of benefits but also factors where digitalization could introduce detriments for some, like the disappearance of current occupations or the stress factor of changing methods and learning requirements. It is notable that the discussions did not address the negative aspects of how current work practices are perishing but that the atmosphere remained mainly positive and hopeful toward future transitions. Nevertheless, digitalization was seen as the way of the future (as will be seen in Chapter 6.1 when discussing the digital medium). The effects were expected to open new opportunities and the attitudes reflect a hoped-for move forward with work and living practices.

5.3.3   Study and education

The findings have presented how digitalization is bringing new ways to services, to work and for people to enjoy their leisure time (see Chapter 5.1.1). Common to all the effects has been how the transformation introduces a learning curve for the novel and changing ways. The adjustment to changes requires unlearning previous habits as much as it requires adapting to the coming means. The previous subchapter already addressed the change, as the participants recalled this double-sided aspect of learning creating reluctance toward the digital change or introducing a reality to which they are not suited. Digital transformation is thus introducing a requirement for lifelong learning, as it seems impossible to imagine that digital development will stop anytime soon (see Chapters 2.4.2 and 5.1.1). 'Learning' refers to a constant willingness and requirement for studying but also aims for diverse educational degrees.

The topic of study and education presents an interest in remote study options. The topic of studying gained a lot of attention among the DC participants—and rightfully so, as it was also one of the core services that would be vital for families to become inhabitants of rural areas. The remoteness, along with the lack of countryside residents, presented a challenge to service opportunities, which was seen in the disappearance of the smaller town schools and daycare services, among others. In their discussion, however, the members found an innovative use for old, abandoned schools with the support of digitalization, as they could function as remote units for some of the students.

> *"The empty schools are one of the problematic focal points where digitalization could help. At least so that some of the school days could be done remotely, so that the children would not be suffering for such*

long school days, as they tend to feel for the little children."
(DCL3G2P5)

Due to the need for the services, the participants demonstrated admirable initiative, as they have already been utilizing the teaching and studying related digitalization, which the discussion shows.

"We gathered different activity groups and school groups together and offered afternoon activities through online solutions. There was some online handicraft and teaching solutions, support teaching and help with homework and also a cooking program for remote-living kids to make their own afternoon snacks at home" (DCL3G1P6)

"I taught a remote course to the university of applied sciences and for two years I didn't even visit the office facilities." (DCL1G1P1)

Among the members, there was even someone who had managed to study a full university degree totally remotely from a university of applied sciences. Despite the positive experiences of remote teaching and studying, the members still wanted the offerings to gain more attention and better access.

"There could be more of these remote study options, and they could easily be fulltime options. All the way from high school to college and university, and also elementary schools with some restrictions."
(DCL2G1P8)

The remote studying or teaching options were seen as time-saving opportunities for families whose children need to travel long distances to reach the nearest school. As one member (DCL2G1P7) said, remote teaching was hoped to prevent children from travelling multiple hours to school each day. Since schools are becoming fewer, digitalization could bring teaching remotely to students' homes. Through their perception, the group was hopeful that such remote teaching solutions could be arranged to support people's lives in the countryside. Progress on educational services was even envisaged as facilitating bringing more people to the area, as it could provide a hybrid way of life, partly in the countryside and partly in the city.

"A concrete and easy solution for the accommodation problem would be having the study period divided in four, two blocks in the autumn and two during spring. Wouldn't it be easy to take the autumn two periods, first there would be a course for one group who would do it

*remotely and then the same in the other period for the other group
and they would swap the housing."* (DCL2G1P8)

"They could live both countryside and then there in the city"
(DCL2G1P9)

Even though the conversation dealt with an important topic that the participant had already said they had experience with, the discussions did not go so far as to address the quality of the remote teaching. It was mentioned that the amount of remote teaching for smaller children should be considered, since being provided with physical social interaction was an important aspect of their growth. Nevertheless, the innovative discussions were able to draw attention to the whole of the issue, as the solution would supporting better attraction to the area, good use of the existing facilities and the promotion of a strong digital infrastructure for other needs as well.

*"You wouldn't have to leave for any course or teaching outside your
hometown or abroad, but we could bring the services to us with the
use of technology"* (DCL1G2P1)

In the OJ conversations the childrens' schooling issues did not enter the conversation in any particular way, but as a part of the clinic's care that also involves educational approaches for children the technology aspect was mentioned as a current critical necessity (OJD2G2P3). The ubiquity of digitalization (Chapter 5.1.1) shows how the digitalization elements have already become mainstream and a direction for the future, so that if an education lacks it, the teaching quality is already considered to be affected. All in all, the participants presented admirable qualities for overcoming the detected obstacles by taking advantage of their surroundings and the increasing digital opportunities to serve their best interests, both within the hospital clinic's services and for the teaching and learning opportunities in the rural surroundings.

5.3.4   Smart technology

The advantages of the digital technology are often related to its ability to connect with other artifacts and systems as well as with its environment. Through these capabilities, the advantages of digitalization are also hugely expanding, and the consumer market is somewhere where the benefits are being gathered (see Chapter 2.4.2). The topic of smart technology represents how the participants were perceiving the advantages of digitalization for their home and leisure-time use. Studying and education, and the impact on work, also hold a requirement for a strong,

connected digital infrastructure. The same reality was addressed as a part of the smart technology insights, as Goddard, Kemp & Lane (1997: 130–131) were quoted in Chapter 2.4.2.

The perception of home digitalization was drawn to the areas of safety and wellbeing, but some of the considerations went to the pleasure and entertainment dimensions that digitalization possesses. The solutions were hoped to provide preventive measures for the elderly in support of their wellbeing at home, which would also have a positive effect on the pressured elderly care, as the later chapter 6.4.5 will show.

> *"Could digitalization bring some solutions for elderly to manage safety and have a longer time at home, before the need of an elderly care home."* (DCL1G1P3)

The infrastructure requirements also apply to the average consumer who wishes to take advantage of the digital offerings for their safety and pleasure. This example shows how smart technology saved a participant's home from a fire:

> *"I got a fire alarm from home as I was going to Formula one race so I could immediately ask my neighbor to go check the situation."* (DCL3G1P1)

The discussion about the digital infrastructure demonstrates peoples' awareness of the technological opportunities, and some already seem to appear as experts on the field.

> *"Within a couple of years this home automation will become an everyday thing. It is totally clear. People do understand how fine their big home television screen is and the opportunities that it provides."* (DCL3G2P5)

> *"The screen has the ability that you can enable video connection. It has it for this sensory technology. It is so that when you have the motion detector there and if the person has not moved. What do I do then? Then I have a camera there, a type of 360-degree web-camera that allows me the access to view the apartment. It has a speaker and a microphone, so I can speak with it."* (DCL3G2P7)

The fluency of the discussion about technical matters enabled the participants to use their intuition regarding how the technological infrastructure could be used, and their suggestions pointed toward people's health, wellbeing, and safety. For example, technological involvement was suggested for elderly people with memory

disorders, for children, and for the business sector, as technology was recognized as an integral part of multiple transactions happening in the business market. An example of utilizing the digital medium for a real estate market came from the group: a 360-degree camera had been used to film the target household and that was found to be a key way to attract more attention and gain questions for promoting the sale (DCL3G2P5). Thus, digitalization was recognized as a factor for raising interest and attractiveness, both of which were thus tied to the attributes related to digitalization (see Chapter 2.6.2).

Smart digital solutions often connect to all areas of digital development, like the digitalization of work and studying introduced insights where the technology would be observing and responding to stimulations within its network. In the conversations, both the DC and OJ members presented their digital forecasting abilities, as they stated how the smart home technologies would be rushing into homes within the coming years, or how future digital surroundings have already been created and are just waiting to spread into more common use. The observation is good to see, even if the insight is not something new (see, for example, Drucker 1998, Castells 2010, Berners-Lee et al. 1994), because the considerations still illustrate a good sense of acknowledging one's environment and a good insight about the nature of digitalization (see Chapter 2.3).

5.3.5 Health Care and Wellbeing

The digitalization of health care and wellbeing is a topic that the previous chapters have also addressed, as the attractiveness of an area and desirable services support peoples' wellbeing (see Chapter 5.2.2). Equally, as the participants brought up in the smart technology chapter, digital technology can create a secure and safe home environment allowing the elderly to remain living in their homes. On top of these, the OJ addressed solutions that they saw fit the hospital environment and wished to adopt for its services. As can be seen from the involvement of digitalization within the OJ outcome (Niemi et al. 2017), its elements can easily engage as a part of health care services and organizational processes.

Based on the dialogue during the conversations, the health care sector justifiably earned considerable discussion time, while also being supported by knowledge about the changing Finnish demographics and the national trend towards an aging population. This is perfectly in line with the Finnish national developmental aims, as the Ministry of Finance (2021) has expressed, and also in line with global and European digital development visions (see European Comission 2022; OECD 2021).

"The digitalization of health care, regarding what could be taken there and what kind of ideas could be used, those are going to be great challenges in the future. Those would be the things that interest me." (DCL2G2P3)

The growing need and demand for health and social care services was well recognized and the digitalization aspect was widely acknowledged to provide novel solutions for organizing and supporting the services. The participants had an understanding of how the evolving digitalization has the potential to distribute limited health care resources more effectively and by doing so enable resource diversion to other areas.

"We have to think that something could be made better by digitalization so that it gives space for more important issues, for example in elderly care." (DCL1G1P1)

An example showed how the use of a video connection helped to create patient safety and work for people's social interaction needs, when the care personnel were not available to take care of these factors (DCL2G2P3). By these examples and experiences, digitalization presents its usefulness and the advantage of providing care support all the way from homes to public health care organizations. The only limiting factor is the required presence of well-functioning digital infrastructure, as discussed in Chapter 5.3.4, as well as people's understanding and knowledge of it.

As explained in Chapter 5.1.2, digital transformation should be utilized by taking full advantage of what it has to offer and find the methods of doing things "easier and wiser" (DCL2G2P4). The same ideology carried over to the consideration of health services, as the participants addressed how digitalization should be utilized for people's benefit and how digital means should take over the responsibilities it can handle. The intention was to enable more space for meaningful human interaction in service delivery (DCL2G2P3). The insight is in line with the theoretical perspective on digitalization, as Willoughby (2004: 12–14) was quoted in Chapter 2.3.

The same topic was raised within the DC conversations throughout the groups, and the health care sector was hoped to gain a productivity boost from digitalization, as it contains many processes that could benefit from digitalization. The effects were mentioned as coming from effective data processing, like scheduling and data management where digitalization could free resources for other use. But along with the positive views of digitalization, the thought behind it was that it could function to secure the human element in the interaction situations.

> *"There needs to be human interaction but then again some of the services can be safely and securely digitalized for maximum benefit."* (DCL1G1P4)

So far, the chapter has explored how the participants considered digitalization as a support for health care information and task management in order to permit professionals to give much needed attention to the actual care work. Along with this, the technologies included under the banner of smart technologies (see Chapter 2.4.2) provided extra protection as well as interaction possibilities in a situation where it would otherwise be impossible. These insights have mostly come from the DC conversations, which perhaps had a slightly broader perspective on the topic of health care than those of the Organizational Jury. The OJ insights can be seen to investigate more specific development suggestions, which is natural as they had their own specific services in mind. The OJ insights neatly cover creation of digital artifacts, services, and solutions, so based on the perceptions of the clinic's personnel and service users, digitalization can quite easily benefit hospital services.

For digital artifacts, the conversations suggested the example of an animal therapy option as used among the psychiatric services. From animal therapy the idea moved to the use of robotics, which again was an example that the participants remembered as existing. Robotic animals have been used in some care facilities to provide company for the patients.

> *"Wasn't it a seal, baby seal that was used there?"* (OJD2G3P3)

> *"It was in the elderly care home that the residents were able to pet it."* (OJD2G3P3)

> *"And it has gained outstanding research outcomes."* (OJD2G3P1)

Even though the previous conversation specifically stressed that human interaction is important and services need to have face-to-face interaction between the professional and the patient, the example of a robotic animal says that the perception of the topic might not be wholly black and white. That the employees in the psychiatric care facility are willing to consider robots in their treatments reflects how far the technology has come: it is now perceived to appeal in a desirable way to the patients' emotions.

Another type of example comes from a service suggestion that utilized a mobile application for the primary care approach. This is where the health care's intentions were to approach and detect as effectively and as early as possible the people

in need. With the mobile application a person would open a path to mental health services with the least amount of effort from the contact as possible.

> *"It has that kind of help buttons that when you need help and support just click there. ... it shows the options from your area, where to call etc."* (OJD2G3P1)

> *"It has online therapy and all sorts of you can find. ... This is the present-day opportunity that you don't necessarily have to get up from the couch, as a depressed youth you can get the help through that."* (OJD2G3P1)

Since digitalization has become ubiquitous (see Chapter 2.4.2), mobile solutions are easily at our reach and people are acquainted with them, which makes the platform desirable for these types of first contacts; this is the perception with which the OJ participants were agreeing. The mobile applications market provides a vast range of opportunities for their expanding features but also in the way the solutions connect with people, with their daily habits, surroundings and with other devices and systems that they hold (see Chapter 2.2). This is an insight that led the conversation to consider the mobile application platform. Since mobile applications are, at least for most people, permanently accessible through their smart phones, the application platform was considered to serve perfectly the clinic's service need for the patient to keep a diary out of their daily activities.

> *"I was thinking that same diary idea and you would think that it shouldn't be anything too difficult if you think of current day applications. That is a brilliant* [solution] *for someone."* (OJD2G3P1)

> *"And that diary idea you can use in diverse other cases."* (OJD2G3P3)

Along with the possible ease of use and solving any issue of the diary not being with the patient, the mobile application was seen to provide the benefit of easy information sharing as well. Psychiatric care operates in a multiprofessional network where different experts perform evaluations of the patient's wellbeing. This is where the mobile and digital application platform was recognized as particularly helpful, as the information could easily be shared between experts.

> *"Like in the case of eating disorder, it goes to the nutritional planner, to the doctor in the somatic area, and to the psychiatric care. That way everyone is on board about what is happening."* (OJD2G3P3)

The idea resonates well with the collaboration and information sharing aspect mentioned in Chapter 5.3.2, where the OJ participants hoped for a better, more

effective collaboration between experts. So like the ubiquitous mobile application serves the needs of the customer, it provides the same benefit to the professional network as well.

Despite the range of findings, the social and health care services were recognized as a complicated area to approach. Possibly due to their sensitivity, the OJ participants especially were somewhat dubious and hesitant to express anything too certain regarding the use of digitalization (OJD2G1). The challenge may lie in the issues with the involvement of high levels of bureaucracy and legislative interference in the development, which is necessary in the case of health and social care due to its sensitive human content. The perception also came up during the OJ conversations as the participants considered IT investments along with the information security that is included in the services. The participants ultimately came up with multiple development suggestions, which also reflects their positive insights into the use of digitalization within the health sector, where the issues can be recognized as being difficult to solve due the complexity of the topic and the breadth of the involved perspectives. The insight appears to be in line with the description from Raisio, Puustinen and Vartiainen (2019), who argued that health and social care were filled with so-called wicked problems (see Chapter 2.6.4).

5.3.6   Travel and Tourism

The travel and tourism topic appeared important to the DC participants, as the digitalization options digitalization were seen to provide help overcoming the shortcomings in these areas. The commuting aspect raises a lot of challenges, with many of them related to the long distances and some to the environmental conditions in the locations. The participants defined these challenges via the characteristics of the locations (see Chapters 5.2.1 and 5.2.2). Along with the commuting and travelling issues, tourism and promoting the desirability of the areas were perceived as dimensions that the advances of the digital technology could help to promote (see Chapter 5.2.4).

Both topics presented themselves throughout the DC conversations, as the features relate to the people's wellbeing in the area. Travelling, commuting, and transportation presented themselves through the long distances, lack of available services and the low number of inhabitants. The concept of travel is seen in many forms: in means of transportation, in daily commuting needs, and in the delivery and accessibility of goods. In addition, the travelling aspect also relates to tourism by the influence of the accessibility and by the offerings of the area for travelers despite the transportation challenges.

Among the conversations, the evolving digitalization was perceived as already solving some of the challenges that areas are facing. Digitalization was referred to as diminishing the need for travelling, as people would be able to work more from home, and children could have home schooling options or use of the nearby facilities for online teaching. Similarly, the children's afternoon care could be arranged partly with remote guidance and supervision, an option with which some members already had experience (see Chapters 5.3.2 and 5.3.3). Despite the actions already taken, the requirement of travelling and transportation was still perceived to exist, as participants mentioned that in their current situation households are required to own almost as many cars as there are people due to the lack of public transportation (DCL2G1P9).

The development ideas for transportation utilized existing technologies, such as building and strengthening roadside digital infrastructure, GPS sensor technology for the vehicles, and online map usage by self-driving cars (see Chapter 5.2). The recognized innovations also took advantage of already-known ideas like carpooling and ride-sharing, or alternative taxi solutions rising from the awareness of the Uber solution. The groups' creativity leant strongly on current technologies but when encouraged, the ideas also took a more imaginary approach at times (see Robinson 2011: 6).

> *"Then there are also those miniature helicopters, which do already deliver mail and other things. And for sure quite soon people will be travelling from here to Kajaani with some sort of helicopter solution. Even if we are now laughing to that but most probably, we will find such cheap energy that there is no need for building roads or even obeying some of the traffic rules."* (DCL3G2P6)

The use of drones presents how a once-imaginary technology becomes true as time passes, like the example of drones delivering desserts and candies in Helsinki demonstrates (Tekniikka ja Talous, 19.5.2021). The idea itself is not yet the ubiquitous but demonstrates clearly how a something once only imaginary can, with time, become real.

The strength of digitalization for tourism appeared as the ability to impact on areas' attractiveness and accessibility, which was seen as a method of influencing the flow of visitors. The participants valued the feature of appearance, which raises curiosity and invites a deeper look into the area's possibilities or into the services that are being offered, as Zagel & Bodendorf (2012: 697), quoted in Chapter 2.6.2, mention. It was also discovered that sometimes the manufacturer of attractive digital content can already be found in the community, as in the case of the Digital Café:

"I have to say, when you said that you would need to enter that blue trail: I have 700 of those 360-degree pictures from there, Kuhmo nature trails. Just because, since I moved here, I needed to explore the places here." (DCL3G2P7)

"I remember those, magnificent pictures. The thing that the town transforms into this virtual reality and that you can engage people from wherever around the world. Your own town." (DCL3G2P3)

Over time the digital means have become more accessible and easier to use, which helps average consumers and hobbyists to take the opportunity to start producing close to professional-level content. In the shared dialogue, the group (DCL3G2) brought up the importance of attractive appearance: websites, for example, are perceived as a window to the town representing all of its offerings. The design and functionality of the solutions need to be up-to-date and align with current expectations to transmit the desirable view for the visitor. The appearance and functionality frequently provide people's initial impressions, which either invites or repels them from the website. The participants admitted how an outdated appearance on websites can either intrigue or guide the visitors elsewhere, but also incorrectly produce outdated and even false information. At its best, the beautiful imaginary and appealing content promotes positive outcomes by supporting strong solidarity and local pride among the people, as was found with the idea of virtual marketing of the area (DCL3G2).

"This brings also the community more together and builds coherence." (DCL3G2P3)

The experience of the location depends greatly on the mental representations that people have and form from a place (see Chapter 3.3.4). Old pictures can bring adults back to their childhood experiences, thereby appealing to their emotions and creating an emotional attachment to the area, which is something that younger generations are not able to achieve. This insight also highlights how an offering needs to be designed according to the target audience, when different generations represent different desires and appeals that build connotations according to their individual memories. The proposed idea was to present the locations with old pictures as they were, no matter whether summer or winter, and then show the change after 50 years.

"Everyone could put their pictures there in the virtual town. That this is how it was then, beautiful pictures" (DCL3G2P3)

"It would be a kind of an amoeba, that every town could be different. And according to what kind of people have lived there and how the people are currently." (DCL3G2P3)

"Yes, that history, like a school would be photographed and then you have a picture of the old school, that is something. You would return 50 years later, there it is." (DCL3G2P7)

The offerings of the area can be built based on the emotional and experienced memories related to the locations, as the example of the pictures suggests. The affordance perspective also reminds us about this, as the subjective perception is formed based on the observation, which is then influenced by the past experiences and situation-related emotional affections (see Chapter 3.3.4). The affordance perspective reminds us that the development actions of an area should take the history, the events, and the emotions of people into consideration, since these factors can contribute greatly to the success of the development outcomes.

5.3.7   The digital ecosystem

The discussion about digital transformation ultimately comes down to how well the different parts of the system function together. The digital ecosystem gathers all the software, hardware and network solutions and infrastructure together (see Chapter 1.1), along with the users who operate the ecosystem functionalities, as the ecology of artifacts emphasizes (see Chapter 2.5.1). The importance of the ecosystem and ecological thinking was acknowledged in the conversations and involved discussion by requiring a holistic approach and systemic view of the functioning of different parts of the digital ecosystem. The whole concept of digitalization was perceived as the way of the future and as a worthy investment for the coming needs—but only when its parts functioned.

"(Digitalization) It is for real the number one issue considering the living conditions of the citizens in the countryside. The second issue is data network connectivity, which is good for us but not even close to good in many other municipalities." (DCL2G2P1)

"I tried updating Facebook in neighbor town youth party, but it just did not function and then I realized that they are using the same cellular tower as do we. But they are many kilometers further away." (DCL1G1P1)

Despite the network, software, or device functionalities, the pitfall is still the people for whom the solutions and services are usually crafted. The observation reminds about the individual requirements and considerations about the ecosystem functionality through the whole ecology of artifacts (see Chapter 2.5.1), that fundamentally refers to the unique individual needs and requirements for the ecosystem.

> *"If you don't know how to use them, every service requires electronic identification. For example my parents are already over 70; they do not have any online bank identification because they do not have any chance of using a computer there. If they are forced to use electronic services, then I must use my own identification for them. They don't have that opportunity."* (DCL1G1P2)

> *"If we are about to create a totally digital environment, we will be marginalizing these. They will be totally excluded."* (DCL1G1P3)

The conversation highlights the factors and requirement of holistic thinking, that digital transformation needs to be perceived through the requirements of the artificial surrounding as well through the perception of the users. The observation reminds us of the meaning and importance of the socio-technical approach (see Chapter 2.6.3). Most of the benefits of a usable digital ecosystem are directed to the people who have a good knowledge of the existing opportunities, as in the case of a participant who was knowledgeable enough to build his own devices and made digitalization work for him as he wanted.

> *"I'm utilizing machines that cost 35 euros that can easily be used with these sensor technologies. So, they do not cost anything. It looks like a soap box and can be used to transmit data in a fast broadband network"* (DCL3G2P5)

The level of skills, motivation, resources, and time are of course some of the influencing factors here determining whether a person can achieve that level of self-sufficiency within digitalization. The reality of the digitalization thereby affects different people differently, and the accessibility depends on underlying factors like knowledge, economic wellbeing and the availability of many other resources for getting into the digital ecosystem. The dream of a widely possible digital transformation does not depend solely on networks, solutions, or devices, as even with access to all the artifacts, digitalization will still appear differently from one person to another (see Chapter 2.3).

> *"We found a good house and because I went along with a car, I had antennae and meters, and measured that will I be able to work. And that was the key factor, because I could not move to a place that where I would not be able to work."* (DCL3G2P7)

Along with the comment above, the participants' perception of the digital ecosystem highlights the importance of the successful interrelation of the parts of the digital ecosystem. But along with a functioning ecosystem, each actor still has their individual approach to the things that need to be understood regarding the digital development aims. Thus, the user and the tools they wish to use need to be seen in relation to each other, like the ecology of artifacts indicates (see Chapter 2.5.1).

6   CONCLUSIONS AND DISCUSSION

Despite the expanding and developing abilities of artificial intelligence, digital solutions still include the element of a user in some part(s) of the operating sequence. The interface of human-computer interaction becomes visible within the overall functioning of digitalization, whether it is a developer, producer, or customer orientation. As an artificial creation, the digital medium thus always involves the user perspective in some form or another.

As the theoretical approach revealed, the digital medium presents itself in many forms and in many applications. The characteristics provide multiple meanings to the digital entity, which can be perceived differently according to the values, motives, and expertise of the observer. In addition, the artificial nature of digitalization gives the concept almost unlimited development possibilities. Overall, the digital medium presents itself in a rather abstract form that withholds potential for multiple functions and has limitations deriving from the involved ecosystem.

The conclusions reflect the potential and the inhibiting factors related to the digital medium and its utilization. The view is based on the research framework triangle, with the aim of presenting the dimensions of the digital medium and the perception of its features. Conclusions about the insights into the digital medium, the perception of the digital affordances, and the method of forming insights in a co-creation setting are described below. The concluding thoughts are supported with the relevant findings from the empirical settings.

Affordance theory formed the main theoretical framework for the study, as the perception of affordances defines the factors that the surroundings can provide for the observer. With the intention of understanding digitalization and the potential for utilizing the medium to benefit people, the main research question targets the context of the digital medium and the forming of affordances.

1.   What is the meaning of affordance theory for the utilization of the digital medium?

The meaning of affordance theory is answered through the following sub-questions, which create the comprehensive understanding of the users' perception of digitalization. The sub-questions relate to each other in a reciprocal manner, but the explanations are provided in sections that follow the order of the questions.

a.   What are the insights associated with the utilization of the digital medium?

b. What are the user-related perspectives that require consideration regarding the exploitation of the digital medium?

c. What does the co-creation approach add to the affordance theory approach?

The research framework triangle (Figure 2) forms the structure for the conclusions, as it presents the factors of the digital medium, the affordance perspective, and the co-creation of digitalization as the method for discovering the collective perception of the digitalization. The following chapter responds to the research questions with syntheses addressing the digital medium, the features of the perception of digital affordances, and the factors of the participatory-deliberative design, which together form the co-creation approach to the perception of digitalization. After synthesis, the conclusions reflect the case-relevant empirical findings to provide the users' perception of the affordances of the digital medium.

What are the insights associated with the utilization of the digital medium?

The theoretical approach (Chapter 2) revealed a multitude of factors that affect the use and potential of the digital medium. The medium itself defines some of the opportunities and limitations, but the whole ecology of the artifacts introduces the ecosystem requirements for the use of the medium. From the user perspective, the digital medium can be understood and utilized in a variety of ways, as the findings in Chapter 5.1 reflect.

The synthesis of the digital medium (Figure 16) identifies the features of the theoretical approach that together build the meaning of the digital medium. The dimensions of the digital medium can be seen to branch out in multiple directions, influencing societal development, organizational activities, business, and people's behavior. The description of the digital medium (Chapter 2) provided a detailed view of its digitalization-related characteristics, including their demands and consequences. The reality of the digital transformation becomes apparent through a comprehensive awareness of the interrelated interactions within the digital medium, as the use and development of digitalization are related to the technological offerings, available resources, and the correct perception of the offerings.

The interdependencies and the integration of the digital medium needs to be considered along with the context-related factors. The synthesis collates the appearance of the digital medium and explains how its meaning builds through the key features that can be detected from the phenomenon.
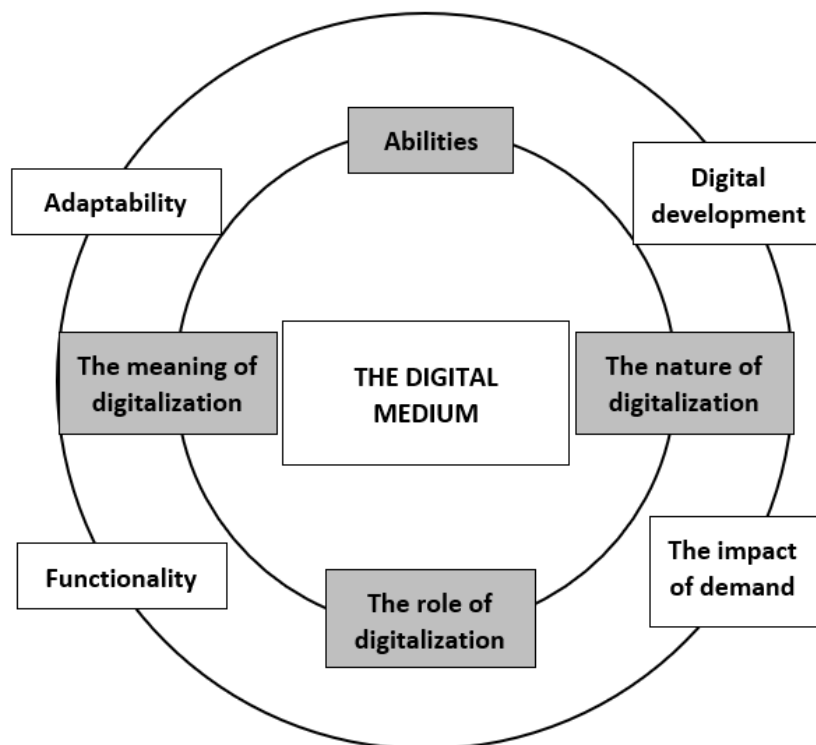
Figure 16. The synthesis of the digital medium

The figure presents a two-stage circle that illustrates the formation of the digital medium through its factors. Within the figure, the inner circle describes the elements that define the digital medium: abilities, the nature of the digitalization, the role of the digitalization, and the meaning of the digitalization. The circle is interpreted clockwise, with the former elements defining the properties of the latter (see Chapter 2.3).

The outer circle present factors that influence the elements of the digital medium, and ultimately affect the meaning of the concept. For example, the digital development affects the available abilities, but similarly the factor also influences how digitalization appears. The four factors of digital development, impact of demand, functionality, and adaptability affect the core elements, both separately and in interaction with each other.

The following sections will view the digital medium's factors in conjunction with the empirical findings to generate insights about the digital medium.

The findings represent the users' perceptions of the digital medium, as the participants considered their opinions, desires, and insights regarding the matter. The conversations went in multiple directions within the project events and provided

user-based insights on diverse topics from work to leisure activities and in support of people's general wellbeing. Generally speaking, the perception of digitalization appeared welcoming and hopeful towards the ever-more-digital future but took a careful and considered approach to the solutions. The positive atmosphere was evident in the conversations, as the participants expressed that the reality is that digitalization is already everywhere and affecting everything, as the concept of ubiquitous computing illustrates (see Chapter 2.4.2). The comments in the dialogue supported each other, agreeing on how the digital transformation was seen everywhere and is expected to provide a positive impact on things. As with the concept of creative destruction Schumpeter introduced, how old habits make way for new and better ones (McCraw 2010).

The breadth of the ideas that reflect a wide spectrum of use-cases involving digitalization advances illustrates the multiple meanings that the digital medium has in the participants' thoughts. As Chapter 5.3 presents, the digital transformation was hoped and expected to impact multiple areas of work, education, health, and tourism, but the functionality of the digital medium required considering the whole ecosystem and thinking as the ecology of artifacts requires (see Bødker & Klokmose 2012; Vasiliou et al. 2015). With holistic implementation, the digital artifacts, services, and solutions can take the role being offered to them.

Some of the entrenched attitudes could, however, be seen as setting restrictions on digitalization's potential, which reminds us of how the digital reality appears differently to people (see, for example, Rodden 2008). From the technological perspective, digitalization's abilities appear increasingly ready for use in demanding operations, but from the adaptability perspective, the participants recognized how the structural- and knowledge-related resources were limiting the spread of the transformation and ultimately affecting the role that technology could play.

When the empirical research was undertaken in 2016 and 2017, the technological advances were already recognized as holding abilities that could support work-related activities in a meaningful way. The perception of the abilities and progress of future development portrayed a view that raised the demand and caused the participants to set more emphasis on the digital artefacts and solutions that could address their work demands.

The demand placed on the spreading digitalization was however confined to the functionalities, on how the solutions need to make existing ways either more effective or more convenient (see Yoo & Euchner 2015; Schedler et al. 2019). As such, the functionality of the whole process needs to be considered, so that the addition of digitalization does not inhibit the effectiveness. With a dysfunctional solution,

the whole digital ecosystem can start burdening the overall operation, and the promise of efficiency turns into inefficiency, as the findings revealed.

The previous idea made a demand of digital development, that its abilities and their functionalities should serve the task instead of burdening the means of executing operations (see James & Drown 2012). During the conversations, the participants displayed a creativity that approached the digital medium from the future-orientated perspective. The example of future flying cars showed how reversing the thinking and starting from the point of meaning provides unrestricted freedom to create new ways avoiding existing restrictions. The observation reflects a similar outcome to that identified by Robinson (2011), who emphasized the pursuit of creativity.

The creative conversations progressed through the features of the digital medium, considering the characteristics presented in Figure 16. The conversations addressed the interconnectedness of the features, as the imaginative visions progressed towards the realistic considerations of the required abilities of the novel ideas. Overall, the participants confirmed how the meaning of digitalization needs to serve a recognized meaning and function to fulfill a purpose without imposing additional requirements.

What are the user-related perspectives that require consideration regarding the exploitation of the digital medium?

The user insights about the digital medium successfully presented a variety of dimensions that relate to the utilization of the digital medium. But in the integration and use of technology, the functionalities usually require users as the intermediaries within operations (see Ritter, Baxter & Churchill 2014). The functionalities thus rely on the compatibility of the user and the digital medium forming a working interaction (see Mumford E. 2006). The following section highlights the features that enable a functional relationship between a user and the digital artifacts and services. The outcomes are referred to as the affordances of the digital medium.

The perspective of the affordance theory provides an insight into the action opportunities that an environment can provide, as afforded to the observer. The reality is that surroundings appear differently to each person. The objects in the surroundings, whether artificial or natural, appear differently to each person observing the scene. The medium, with its substances and surfaces, offers diverse textures, forms, colors, and an overall appearance that presents different

functionalities and qualities according to the observer's perception (see Gibson 2015; Volkoff & Strong 2013).

Gibson (2015) introduced the view of the affordance possibilities based on visual perception. Gibson's formulation excludes the mental processing of the retinal image and concentrates instead on forming the interpretation of the scene in direct perception, guided by visual information resulting from motion and the angle of view. As perspective is considered through direct perception, representation simplifies the forming of insights, so that the reality is formed without the constraints of mental models. The exclusion of mental models supports the detection of a detailed view of the diverse elements in the surroundings (see Mumford et al. 2012; Johnson-Laird 1983). The current section presents conclusions on the presented content regarding the affordance perspective according to the elements of the *observer*, *the environment*, *the perception*, and *the meaning*, as presented in figure 17. The appearance of the digital affordance depends on each element, while the elements also appear in a reciprocal interaction with each other.
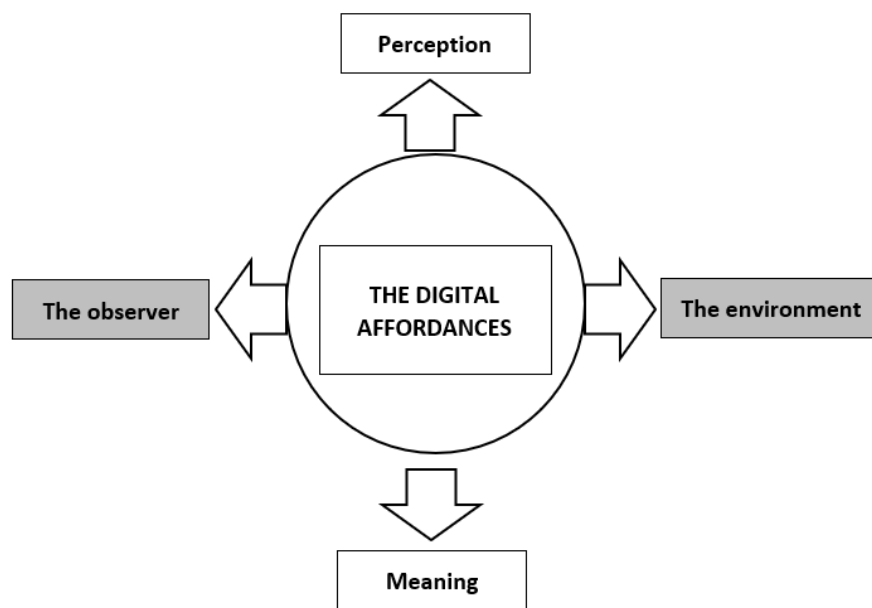
Figure 17.   The synthesis of the affordance perspective

The synthesis of the affordance perspective is explained below by the pairings of *observer–environment* and *perception–meaning*. The observer–environment dimension is based on the prerequisite that the relationship between the two is required for any affordance. The counterparts perception and meaning are inseparable and also appear within the relationship between an observer and the environment. The arrows in Figure 17 show how the elements are interconnected and

highlight how they need to be considered both separately and in tandem with each other.

In the affordance perspective, the understanding about the affordances of the environment is formed based on how the environment appears to an observer, making *the dimension of observer–environment* a key factor of the affordance perspective (see Gibson 2015; Good 2007). The relationship of a person with their environment determines how an individual observes their surroundings and what kind of opportunities they identify from the view. Therefore, the dualistic relationship between an actor and the environment functions as the core of the nature of the affordances (see Chapter 3.3.1). Dualism defines how the dimensions affect each other, determining how the perception is formed and how the elements function towards each other (see Järvilehto 1998).

The dimension of perception–meaning forms the other aspect of the affordance approach that defines the overall interpretation of the existing affordances (see Costall 1995; Neisser 1989b). The dimension of perception–meaning directs attention to the aim and manner of forming the perception of the affordances, whereas the observer–environment dimension focuses on the relationship defined by the characteristics of the two.

Gibson (2015) presented direct perception as a guide for viewing the surroundings, with the aim of discovering the elements of the environment instead of their predetermined meaning. However, despite the direct perception, the observation is also formed in holistic sensation that includes building awareness about the surrounding opportunities, as Chapter 3.3.2 explains. As an example, a scene appears differently to a toddler observing the surroundings from their perspective, which is limited by their physical characteristics and apprehension of the environment, than it does to a grown individual with an existing comprehensive experience of the world and greater reach. The background factors of physical abilities along with awareness of opportunities and the ability to visualize without restrictions directs the observer's perception of the functionalities of the elements in an environment. The characteristics of dualism, visual information, and locomotion are present within the overall insight, as the dualism represents the subjective interpretation, and the visual information and locomotion enable the observer to detect the features in the environment, either as desired or undesired (see Chapter 3.3).

The user perspective on the digital medium brought up considerations from the perspective of the user, from the aspect of the environment readiness and need for digitalization, but also from the technological aspect of the medium, as requirements for the digital artifacts and solutions. The part ended with the emphasis on

the meaning for development and for the digital transformation. The current part addresses findings that enable digitalization to progress to fulfill that meaning.

The observations regarding the digitalization opportunities aimed to create solutions that can support and make an impact on the positive aspects that people perceive from their environment. Within the Digital Café conversations, nature's atmosphere and activities rose to be a major issue that the solutions and artifacts of the digital medium were desired to support and promote. The perception raised various considerations, such as the surroundings requiring strong digital infrastructure to promote all the possibilities the medium provides. The Internet, either as a mobile or a solid connection, was still the recognized core feature, where progress needs to focus. Secondly, the thoughts considered work culture, rather than the technology, which needs to accept new ways of operating and executing work duties. Examples showed how in some areas the digital means were already accepted as a way to work but the attitudes were still seen as restrictive rather than supportive.

The same mental restrictions regarding digital transformation were also recognized as inhibiting area development, as the municipal administration was perceived as restricting changes. The desires channeled hopes of digitalization to multiple areas, like the aforementioned work conditions, but also living conditions, the area of health and wellbeing, and the rise of new service possibilities for locations. The desires then highlighted notable changes for peoples' behavior and lives. As Diamond (2013: 149) stated, changes require cognitive flexibility to transform known and existing habits. Learning new digital skills or building a strong Internet connection appear as secondary observations that follow the mental work that needs to be ready to welcome new ways of doing things.

As the surrounding-related deficits and subjectively perceived desires were expressed, a meaningful consideration was recognized from previous digital development, where the built infrastructure changed to serve people their individual desires rather than the benefit intended for the development. The observation reminds us how important it is to value user perception in development. The appearance of the digital medium thus responds subjectively to peoples' perceptual needs, wishes, and requirements, by inviting or inhibiting to the use of the solutions (see Norman 2013; Norman 2004).

The findings described how the digital means are introducing new methods for reading, for commuting and for many other activities. This outcome reminds us that as the digital medium is fully adjustable and customizable, the ways of introducing digital artifacts and solutions can be designed to meet the users' desires and attract people to the utilization of the solutions (see Simon 1996; Immonen &

Sintonen 2105). This is exactly what the Nintendo *Pokémon Go* mobile application did for some people, as shown in the findings.

It has been found that the digital affordances become true through the observation of the environmental offerings and the subjective perception by the observer. But the second dimension, of meaning, acts as the required guide to the observation. Within the digital medium, the design of things can adjust the appearance of the digital solutions, and thus influence the meaning that the solutions reflect and guide the observation to the target of the perception. The artificial nature of the digital medium, as Simon (1996) observed, provides the means to adjust the appearance and functionalities of the digital artifacts and thus an opportunity to affect the perceptual insight.

What does the co-creation approach add to the affordance theory approach?

So far, the chapter has provided an approach to understanding the digital medium, its formation, and the perception of the user-related considerations. The former considerations have regarded the perception-based insights from an individual perspective, but as the theoretical approach (see Chapter 3.4) proves, a collaborative approach can provide more dimensions for consideration. The collective view and co-creation were arranged by using the participatory-deliberative design (PDD) approach, which forms a symbiosis between participatory design and deliberative democracy. The explanation explains how the co-creation of digitalization relates to the digital medium but also to the understanding of user perception, which relate to the theory of affordances (see Figure 11).

The chapter on the digital medium (Chapter 2) showed how the medium introduces an environment full of complexity, and while presenting solutions it also simultaneously introduces a mix of challenges (Rittel & Webber 1973; Suoheimo et al. 2021). In response, researchers like Osborne et al. (2021), Brandsen et al. (2018) and Torfing et al. (2016) have presented the act of co-creation as a method for capturing the relevant information and producing functional solutions to cope with existing diversity (see Chapter 3.4). Co-creation utilizes diverse perspectives in search of functional solutions, as the methodological approach of PDD aims to reveal the collective perception of and insights about the digital medium. The concept utilizes methodological principles from participatory design (see Joshi & Bratteteig 2016; Halskov & Hansen 2015) and from deliberative democracy (see O'Flynn & Setälä 2022; Munno & Nabatchi 2014; Ackerman & Fishkin 2002), as introduced in Figure 18. The participatory-deliberative design draws focus to the

evaluation of both successful design and the representativeness and quality of the evaluation and decision-making activities *within* the process.
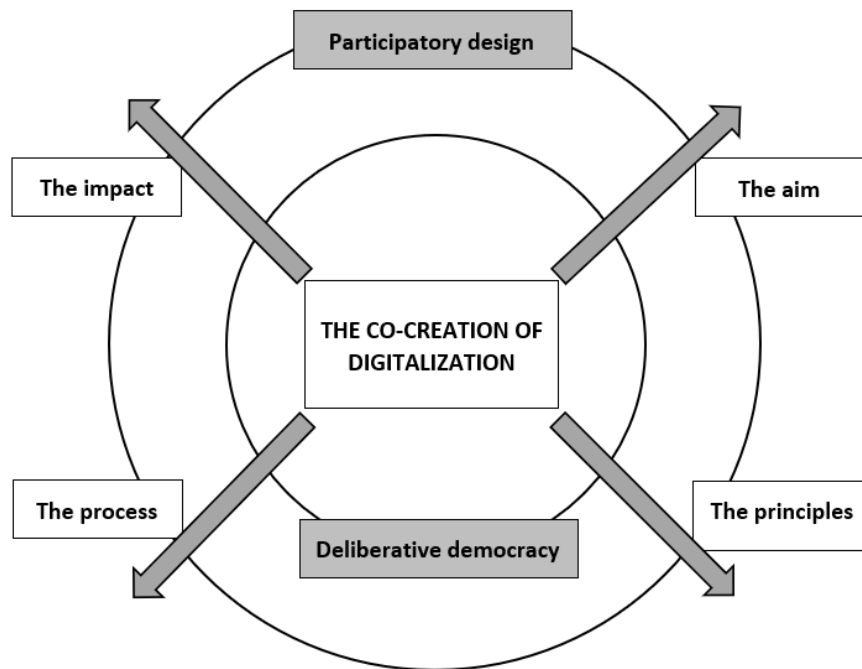
Figure 18. The synthesis of the concept of participatory-deliberative design

As a fusion of the two methodological approaches, the elements and functioning of the participatory-deliberative design are presented in Figure 18. The representation illustrates the concepts with their similarities and their mutually supporting factors made obvious within the participatory-deliberative design approach. The figure is divided into the four categories of *the aim*, *the principles*, *the process*, and *the impact*, all of which create the novel concept of PDD. The categories are further explained in Table 8, below.

Table 8.　　The dimensions of participatory-deliberative design

The participatory-deliberative design (PDD) method represents a co-creation approach for design and decision-making comprising the dimensions of the aim, the principles, the process and the impact.

	Participatory design	**Deliberative democracy**	**Participatory-deliberative design**
The aim	The design of appealing and functional solutions.	Achieving well-informed and justified decisions.	The creation of functional and sustainable solutions.
The principles	The appreciation of politics, people, contexts, methods, and product aims within the design process.	Deliberation, representativeness, and acceptable decisions.	Acknowledgement of both principles, where deliberative democracy strengthens the value of the dialogue and participatory design improves the creative thinking for the desired outcomes.
The process	Building an awareness about the issues addressed by the process of planning, investigating practices, identifying needs and wishes, specifying requirements, concretizing design suggestions, and testing and evaluating in use.	The process of deliberation can be illuminated by the values of information, dialogue, deliberation, and community. The values aim to produce considered judgements about the context-related issues.	The deliberative democracy principles are engaged in each step of the iterative design process of the participatory design.
The impact	Produces creative outcomes to benefit people within the use context	Produces sustainable and justified decisions for execution	Produces creative outcomes with functional design choices, legitimized by the people involved

The predetermined aim of the events set the target within the Digital Café events on area development via the utilization of the digital medium. Within the Organizational Jury, the digital transformation covered a part of the developmental aims. In each case, the discussion context included utilization of the digital medium, which set all the participants to consider the same topic. Similarly, the participants were guided by the same discussion principles and provided with equivalent space for developmental work (see Chapter 4.2). The process involved informative presentations with the aims of instructing the participants about the events and inspiring insight into the developmental topics. Most of the time was given to the group discussions, which were executed either within an afternoon or over several multi-hour gatherings. Within the research projects, the participatory-deliberative design process aimed to create ideas and produce suggestions for digital development, so the process focused on problem-solving that was based on the collective activities of learning, identifying problems, and specifying requirements (see Figure 13). The materializing, testing and evaluation phases were intentionally omitted (See Chapter 4.1.2). The impact of the collaborative work was partly predetermined, as the legitimacy of the process was requested in advance from the relevant decision-makers (see O'Flynn & Setälä 2022; Gutmann & Thompson 1997).

During project planning, attention was given to multiple details in order to achieve successful events (see Chapter 4.2). The considerations involved thoughtful decisions about the facilities, offerings, and scheduling of the events, so that events were able to occur in a comfortable, safe, and relaxing atmosphere. Similarly, great attention was given to the recruiting of the participants, so that well-rounded representation could be achieved. During discussions, the objective group facilitators took responsibility for providing fair amounts of time for each participant, and they guided the discussion so that the situations stayed comfortable and only issues might be in disagreement, not people.

Co-creation by the participatory-deliberative design approach involved a lot of preparation in advance to ensure the implementation of the concept's aim, principles, process, and impact. After the preparations, the involved participants provided the main input for creating user-orientated digitalization remarks and creations through their collective perception (see Chapter 4.2). The collaborative approach added knowledge perspectives to the conversations and increased the considered perspectives, as some of them might not have emerged from subjective considerations (see Brophy 1998; De Dreu & West 2001). The information, opinions, and exchange of expertise was obvious in the conversations, as the members expressed their thoughts in reciprocal interactions where the members complemented and even finished each other's sentences and thoughts. The effect can be seen throughout conversations recorded in Chapter 5. Perception can be

considered as increasing in the co-creation setting: as with research analysis, the results are strengthened by a multi-stage analysis scheme (see Rossi and Tuurnas 2019; 7–10; Chapter 4.4).

In the same way that the insights about the digital medium highlighted holistic considerations for achieving successful digital creations, the increase in perception adds considerations to the thought process. Nevertheless, the opportunity stresses the vital aspect of deliberation, as the mental work needs to consider objectively all the available information to achieve the best result (see Chapter 4.1.4; Jalonen, Puustinen & Raisio 2020). Co-creation using PDD provides legitimacy for the outcomes and enhanced perception for the detection of affordances, which can be seen as greater acceptance of decision outcomes. The result also provides the possibility of a blueprint for development work, which is suited to the type of focus group that produced the results (see Shostack 1984).

What is the meaning of affordance theory for the utilization of the digital medium?

The intriguing topic of the digital medium attracts creatives to utilize its advances for their careers, as the introduction presented (Chapter 1.1). The digital solutions draw people into the augmented reality that it provides, as the findings noted about the use of *Pokémon Go* (see Chapter 5.2.3). Public administration is also turning toward the digital medium as governance transitions to the digital era, as Dunleavy et al. (2005) stated. Digital transformation truly seems to impact everything about people's lives and their social and business activities. The expanded use of the digital medium offers something for everyone, which makes it a key feature while also making it a difficult concept to understand. This research aimed to discover the facilitating and inhibiting factors of the digital medium. As already shown, the concept appears differently to people, which highlights the meaning of the user in the assessments of digital transformation.

The user-centered design approach seeks to incorporate user's preferences regarding form and how diverse creations can be served to people (see Ritter, Baxter & Churchill 2014). The user-centered approach is appreciated in the field of Human Computer Interaction as well as within organizational studies, as Enid Mumford (2006) demonstrated when examining the emergence of socio-technical aspects in research. The apparent importance of the user perception is foregrounded when utilizing and integrating the digital means for common use. Norman (2013) emphasized the design of things in how the solutions should be crafted. The intention was to provide easily understandable and usable solutions for people. The design

ideology is based on understanding the user's perception, where Norman applied the perspectives of the affordance theory from Gibson (1979) to build the awareness of the user's perception.

'The affordances of the digital medium: users' perception of digitalization' introduced the meaning and perspectives of the digital medium in order to provide a view on how to look at and build awareness about the concept. The theoretical approach introduced the digital medium, which contributed to a synthesis that helps to form the meaning of the digital medium through the presented features. The user approach also forms part of the definition, as the user inevitably possesses a role in some parts of the process. The perspectives of the affordance theory—dualism, visual information, and locomotion—function as the perspectives to view the diverse features of the digital medium and form a perception about their meaning. As the findings showed, the insights can reflect diverse perspectives depending on their view of the matter. In the case of transportation and commuting, the potential of the digital medium appeared rather different, whether the solutions were approached from the direction of the restrictions or from the opposite point of view. The ability to view things differently, move to perceive the situation from another point of observation, or adopt someone else's perspective liberates the cognitive abilities to think differently (Diamond 2014: 8).

The affordance theory perspective does not only define and describe how the insights regarding the affordances happen: the description opens the cognitive process to the observer themself and to the development community. Self-awareness of one's insight possibilities provides more flexibility to the user to control how to utilize the opportunities in the environment. The increased awareness also provides the opportunity to understand others' points for observing their environment and explains the intentions behind individuals' behavior. Therefore, thoughtful consideration of the affordance theory perspectives provides an increase in individuals' cognitive capabilities, much like the collective activity of deliberation was described as producing (see Chapter 4.1.4). Due to their similar aims, the approaches can function together for the common goal, where the affordance approach provides the means for building awareness and the collaborative activity the method of doing so.

The success of the approach depends on the person, or the guidance of the process. A person's ability and willingness to view diverse perspectives with an open mind towards alternative options heavily influences the actualization of the affordances. This requirement requires cognitive flexibility, as Diamond (2014) described. Another limitation or potential support for the affordances comes from how the observer is guided to view the surroundings. The deliberation guidelines (see O'Flynn

& Setälä 2022; Nabatchi 2010) offer the potential for the actualization of affordances, as can be found in Henningsson, Kettinger, Zhang & Vaidyanathan (2021: 3–4). The key is still the ability of the facilitator or organizer to guide the participants to adopt the affordance viewpoint in their thinking.

The additional aspects of design and the creation and co-creation of digital affordances support the discovery and implementation of the affordances. As Norman (2013) introduced, the affordance theory influenced principles for design (see Table 1) to promote discovery and the intuitive use of the artifacts. The characteristics emphasized through the design considerations and the enhanced perception provided by the co-creation approach increase the potential of discovering the intended but also the other feature-related affordances, as the emergence of the affordances depends on the subjective insights.

The increasing digital transformation expands the ways in which technologies are utilized, as van Noordt and Misucara (2022) observe in the public sector interest in AI and machine learning technologies, and Brock and von Wangenheim (2019) see in business use. However, the researchers bring out how the integration of and adaptation to novel technologies are being challenged either from the organizational-structural side or on the basis of the employees' skills and knowledge. In Dodig-Crnkovic's (2013) words, the transformation is creating a cognitive revolution, where information is being managed in an expanding ecology. While progress of digital means introduces great promises for the increase of human wellbeing and organizational productivity, the cognitive revolution simultaneously challenges human understanding about the changes happening around it. The key to successful utilization of the digital medium exists in building a holistic understanding through an awareness about the facilitating and inhibiting factors of the medium; this can be served by understanding the user-environment relationship. The perception of affordances successfully opens these considerations: as Gibson (2015: 326) stated, the affordances appear either in a supporting or preventing role.

6.1   Research contribution

The conclusions highlight the impact of affordance theory's influence on people's perceptual understanding. Increased cognitive flexibility creates greater perceptual awareness about viewed circumstances (see Diamond 2014), so that the user's abilities present better capabilities to manage adjustments, change and alterations of appearance in their viewed surroundings. The cognitive abilities enable people to detect multiple affordances from a scene, as the increased perceptual awareness

together with available resources and abilities of a person support affordance discoveries. Gibson (1979) described the emergence of affordances occurring in direct perception but influenced by the holistic nature of a person where self-awareness enables full perception (see Chapter 3.3.2). The dissertation provides the research framework approach (Figure 2) that addresses the concepts of the digital medium, the affordance perspective, and the co-creation of digitalization. The framework supports to form an understanding about the concepts related multidimensional issues, where human observations are required to collate a comprehensive view of the matter in question. The approach introduces a view to comprehend the concepts as stand-alone definitions, but most importantly as a synthesis of them all.

The contribution made by this approach can be demonstrated from the perspective of unexpected events, as the COVID-19 pandemic demonstrates. Due to the global spread of the COVID-19 virus, massive changes needed to be made urgently, which produced an enormous digital leap as a response to the pandemic's effects (see Amankwah-Amoah et al. 2021). As Brunetti et al. (2020) explained, the accelerated digital transformation forced societies, companies, organizations, and people to review their operating strategies, logics, and behavior in a new situation and had to alter and adjust their normal ways.

Simultaneously, a great number of supportive actions were crafted in response to the appearance of an unexpected demand. Amankwah-Amoah et al. (2021: 604) describe the pandemic as something like a natural disaster, recession, or departure in politics and government policy that reflects similar effects, raising the severity of risk factors and resulting in increased transition to digitalization. The discussion relates to the digital medium as a means of executing activities as well as a platform for operating and managing activities. In both instances, the operating environment needs to be evaluated for discovering the potential of the surroundings and the usability of the existing features. In the utilization of the digital medium, the perception of affordances directs users towards the environment where the digital advances could be utilized, as well to the digital medium itself.

The COVID-19 pandemic response represents an extreme case of change, and the utilization of perceptual awareness of the facilitating and inhibiting factors of digitalization can also be found in much more common surroundings and situations. Petersson et al. (2022) discuss how, in the health care setting, digitalization and AI in particular have been suggested as introducing improvements for providing information for stronger decision-making, and acting in support of minimizing medical errors, optimizing care processes, enabling more accessible services and better patient experience, and reducing the overall cost of health care. The results indicate that actions need to be taken on multiple levels, including viewing the

circumstances outside the health care system, concentrating on the internal strategies and operations, and future-proofing the change. While offering many benefits, the outcome shows how adapting for digitalization requires adaptation on many levels. Kruszynska-Fischbach et al. (2022: 4), for example, present how digital transformation readiness is distributed across seven dimensions: core, need, technological, societal, policy, acceptance and use readiness, which necessitates viewing the included attributes from a multiperspective angle and highlights the vast nature of the digital medium.

The impact of the digitalization of public services indicates how the changes also spread among and affect different levels of society. Osborne et al. (2021b) show the service ecosystem impacting macro-meso-micro levels of society, with digitalization reaching policy making (macro); organizational actors, service processes and local communities (meso); and individual users (micro). Just as the main research question responded to the meaning of the affordance approach to the digital medium, the contribution can be detected introducing benefits to multiple levels of society, where the detection of the cause and consequence of the digitalization is required.

The affordance approach provides a perspective to form views from diverse angles and utilize the insights gained in development of the services and solutions. In response to the societal and organizational needs, which are targeted to operate toward specified user groups, the participatory-deliberative design method that incorporates the affordance perspective in its process can capture the various user and stakeholder inputs and expertise via the co-creation approach. The Organizational Jury process already demonstrates the successful collection of organizational knowledge (see Värttö 2019; Lindell 2017; Niemi et al. 2017; Jekunen 2013). The participatory-deliberative design concept can promote the approach by introducing a strengthened emphasis on service design alongside the deliberative democracy representativeness and quality guidance.

The theory of affordances was presented in the Introduction to show a gap in the field of administrative sciences. The approaches found were few and the spread to different scientific disciplines appeared broad. The doctoral dissertations of Finnish authors appeared in Aalto university's department of automation and systems technology. Heikkilä's (2011) study utilized the affordance theory approach to study robots' abilities to manage in human-like communication tasks. The second study represented a dissertation in education, humanities, and theology from the university of Eastern Finland. The researcher, Vesala (2016), used affordance theory to research the relationship between children and their school yard surroundings, where the affordance approach provided the means to interpret the reciprocal

nature of the relationship. The third dissertation dated back to 2009 and was produced in the department of social research in the university of Tampere. Raudaskoski (2009) researched mobile phone usage as a social activity by interpreting the situation-based action potential of the technology using affordance perspective.

Due to the limited appearance of affordance theory within Finnish research, the dissertation adds a contribution to the field of Finnish academic studies and more specifically to the field of administrative studies. Currently, the Finnish health care system has gone through a comprehensive reform (Health and social services reform), that steered the responsibility and control of the services to a larger area. The result requires a new perspective to the topic how the services are organized and provided for the citizens. Questions of this kind require collaboration and collective activity to bring the perception together from multiple perspective. The affordances perspective along with the presented research framework does not solely solve appearing issues, but it can provide necessary views to for the correct perception about the required actions.

6.2 Ethical considerations and limitations of the study

Raatikainen (2004: 155) presents how science is supposed to describe and depict the researched content as accurately as possible. Setting the research aim and methods of approach requires careful consideration and a critical view that will form a suitable research approach in the theoretical and empirical senses. Fundamental to scientific research is how the chosen approaches intend to research the topic at a specific level, producing detailed descriptions of specific circumstances that ultimately still possess a margin of error and option for corrections. The effect is particularly present in humanistic studies where the behavior and action of people are under studies. Responsible and correct behavior relates to the researcher's obligations, when the research findings should reflect the research content as precisely, accurately and truthfully as possible and with a humility towards the process. Hirsjärvi, Remes and Sajavaara (2009:23–27) state how the research ethics of differentiating right from wrong and engaging in ethically correct behavior throughout the research process are values that need to be constantly present within science.

Hirsjärvi et al. (2009: 23) state that the research ethical considerations require researchers to obey the responsible conduct of research, which is (for example) nationally instructed by the Finnish National Board on Research Integrity, TENK (TENK 2012). The guidelines provide a model of responsible research conduct,

promote good research ethics and seek to prevent misconduct in research. Research ethics is referred to as research integrity, emphasizing the honesty and integrity that researchers are obligated to display throughout their research process. The model highlights the integrity aspects at each stage of the research process, from planning, choosing methodology and honoring the research community, to financing the study (TENK 2012: 28–31). The ethical measures remind us all that the research must be conducted in a manner appreciative of the participants (TENK 2019: 8–10), chosen methods and used references, and the ultimate findings need to be presented transparently. The principles also relate to the handling of the research data, which among other things introduces the value of responsibility for the guiding values, as Vilkka (2021) explained.

The research integrity approach highlights the meaning of trustworthiness, which usually presents itself through the concepts of reliability and validity, as Tuomi and Sarajärvi (2018) point out. However, the researchers go on to explain how the concepts are originally introduced within quantitative research and do not necessarily straightforwardly apply within a qualitative approach. The validity refers to how the implementation of the study manages to be true to the research intention, and reliability refers to the repeatability of the study. Due to the criticism of the concepts, within the qualitive approach it is more suitable to review the trustworthiness of the study through the definitions of credibility, transferability, dependability, and confirmability (Tuomi & Sarajärvi 2018).

The research's ethical considerations apply most obviously to the research setting, including the empirical data, and to the findings, as the trustworthiness of the content can in most other cases be detected and evaluated from the content itself. Of course, the current information flow and the accelerated pace of publishing produces new publications at a pace that one can argue affects the timeliness and thus the relevance of utilized publications. Similarly, the time-consuming nature of the whole dissertation process can sometimes challenge the validity of the research. Within the current research, the mentioned issues were somewhat acknowledged and responded to by iterating the chapters during the process, until the final document was finished. This measure represents an action taken to improve the credibility and dependability of the study.

Regarding the empirical section of the study, the precision of documenting represents an action to promote transparency, but also the ability to conform the accuracy of the empirical data, findings, and interpretations. As the original data was in Finnish, the translation of the text to English involves some reliability issues that were acknowledged and openly expressed within the chapter (Chapter 4.4). As the TENK (2019) guidelines make clear, because the research conducted invited

people to participate and openly express their insights and opinions, the gathered data threatens to violate participants' rights regarding their privacy. To prevent this, the empirical data was handled respectfully and reliably, so that the informants cannot be recognized from analysis. The data was kept in the possession of the research staff at all times.

The research intention was to present the topic so that the outcome could be broadly utilized in variety of other topics, as long they hold similar characteristics. Due to this intention, the research thus responds well to assessments of the transferability of the study; that said, qualitative research—as in this case, which is based on the perception of the people—will always present a variance in the findings. The findings can be distorted in two ways: either the opinions can be intentionally distorted by the participant, or the analysis would modify the findings through false interpretation. In both instances, the presented transparency of the analysis supports valid findings; and as the interpretation of the findings is done in tandem with the theoretical perspective, intentional deviations in the data would have been detected. Regarding the process, the act of deliberation defends well against members intentionally misleading the conversation (see O'Flynn & Setälä 2022: 901).

The limitation of the study is raised together with the ethical considerations because some of the ethical weaknesses simultaneously present the recognizable limitations. Research weaknesses come apparent within the theoretical approach, as it is possible that more valid publications could have been presented. Also, the time of the empirical setting is already several years old, so a more recent approach would introduce different, more up-to-date findings. As a justification of the empirical data, as the findings represent a time prior to the COVID-19-triggered digital leap (see Amankwah-Amoah et al. 2021), the outcome provides an interesting platform for future research considerations and a possibility for evaluation against the current situation.

The chosen projects' of The Digital Café and the Organizational Jury represent on one side a functional combination of research conducts that complement each other, as the one views the topic with a broad scope and the other is more focused in its view. Like in this instance the Organizational Jury was more targeted to the specifics of the clinic, and thus also used as a complementary view to the Digital Café findings. The other influencing factor is how the project opportunities came together in a convenient time with their similar but complementary offerings to each other. As the total number of participants settle at 58 the scope of participants in the research setting also questions the findings' generalizability, up to an extent. The participants represent a diverse spread of people from a geographically broad

area (Digital Cáfe, n42), but at the same time the findings are reflected in conjunction with a narrow demographic representation from an organizational environment (Organizational Jury, n16). Rather than a limitation, the study can also argue that it reflects the topic in a manner that is familiar with qualitative research with the target of providing in-depth reflection for the dealt issue (see Alvesson & Sköldberg 2018: 8–10).

6.3   Further research considerations

As Kaivo-oja et al. (2022) stated (and were quoted in the Introduction), the digital medium with its fast pace of development and broad integration into all the societal activities provides an interesting and critical requirement for research. The constant development of digitalization makes it a never-ending medium for the emergence of conflicts, dysfunctionalities, potential for development and polarized perceptions. The research topics can be found from a variety of applications, from the digital solutions themselves, but perhaps even more interestingly from the paradoxes that emerge from the utilization and integration of the solutions. The human perspective on the digital medium provides all the levels of interaction for the research focus, as the human connection has been said to relate to the functioning of digitalization (see Jaime & Sebe 2007). As machine learning and artificial intelligence are perpetually spreading throughout the cybersecurity and safety of the automated processes, they present a major topic for investigation. Sadly, malicious cyberattacks are also a critical thing to observe, both for individuals but also for national safety (see Lucarelli, Marrone & Moro 2021).

The research projects aimed to recognize the facilitating as well as the inhibiting factors related to the digital medium, but also had a rather development-orientated focus within the events (see Chapter 4.2). The events supported opinions and insights from all perspectives, but the development atmosphere evolved to be quite positive towards digital transformation, and as such many of the negatives and doubts that the phenomenon includes were left unexpressed (see Bergman 2022; Lucarelli et al. 2021). The criticism and negative effects of digitalization, which Nieminen (2016), Schou & Svejgaard Pors (2018), and Helbig, Gil-García and Ferro (2009) introduce on the subjects of polarization, digital divide and dysfunctionalities, represent a critical and increasing research direction for the digitally developing administration and government.

Similarly, the national and global demographic development is challenging especially the public service delivery due to the shift in the dependency ratio. The outcomes indicate stronger use of the digitalization possibilities, as the national- and

European-level policy regulations suggest (see European Commission 2022; Ministry of Finance 2021). The increase in strategic and policy support for the digitalization of artifacts, services, and solutions justifies the observation about the digital integration. Among Finnish welfare services, the ongoing health and social services reform (Sote-uudistus) restructures the existing health and social care services, which highlights the need to ensure the functionality of the digital services within the new systems and structures. The roadmap for implementing the system changes also leans strongly towards the acts of co-operation and participation, both as methods of executing the reform but also as a manner in which the restructured health and social care should operate (Sote-uudistus 2023, 19. January)

The national and global view and direction of the development of the welfare services reflect positive opportunities for digitalization-orientated research, where awareness about the individuals' but also the user groups' opinions, fears and insights can provide successful transitions to digital services. The changing arena for public service delivery already presents a vast research framework to continue on this dissertation's research direction, but like Bergman (2022) wrote, the technology industry keeps on developing, which then affects societies, institutions, and people in ways that call for a shift in behavior and working methods. The recently introduced ChatGPT-artificial intelligence application presents an example of that development, as the solution produces writing that authentically challenges human perception (Pavlik 2023; Bergman 2022). The solution resembles one direction of the development, which at the same time reflects positive and negative effects of the digital transformation. The example of the AI's capabilities emphasizes the meaning of awareness and understanding in digital development. It promotes the use of co-creation approaches like the Organizational Jury, which has already shown promise as a collective organizational development method (see Värttö 2019; Lindell 2017; Niemi et al. 2017; Jekunen et al. 2013). The value of collective perception thus provides interesting research and development opportunities for the presented participatory-deliberative design approach.

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