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INTERDISCIPLINARY PERCEPTIONS ON COMPARING SYSTEMS ANALYSIS AND DESIGN TO THE PRACTICES OF DIGITAL SERVICE DESIGN

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ABSTRACT

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This paper is a master's thesis focusing on identifying the underlying relationship between the domains of Systems Analysis and Design and Digital Service Design. Emerging field of digital service design is an important area of research as the methodologies and processes for designing digital services are not comprehensively formalized as compared to more mature fields such as system design. This thesis provides both the academia and business domains with strengthened theoretical grounding, conceptual foundations and discussion points for future development of co-utilizing methodologies of service design in systems development endavors. The primary objective of this thesis is to contribute to the information systems research community by identifying, analyzing and describing the similarities and differences between the selected essential sub-constructs of studied domains. This thesis does not claim to present a complete framework for integrating the two studied domains, but rather delves into building foundations for stimulating academic interest on furtherly studying the linkage between the domains and potential issues involved. As a secondary objective, this thesis studied the possibilities for interdisciplinary applications between the domains. This thesis employed a qualitative research methodology in the form of subject-matter expert case interviews supported by a literature review. Findings of the study strongly suggest that linkages between system analysis and design and the methodologies of service design exist and that the fields could benefit from each other. For instance, the involvement of service designers in the development of systems could help in building the initial understanding of a design problem, capturing system user insights, and in conceptualization of solutions together with the technical implementation team.

Keywords: systems analysis, systems design, systems development, service design, digital services, digital service design

TIIVISTELMÄ

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Tässä Pro gradu -tutkielmassa syvennytään tunnistamaan yhteneväisyyksiä tietojärjestelmäkehityksen järjestelmäanalyysin ja suunnitteluvaiheiden (System Analysis & Design), sekä digitaalisen palvelumuotoilun (Digital Service Design) menetelmien välillä. Digitaalisten palveluiden tutkiminen on tärkeä kehittyvä tutkimusalue, sillä niiden kehittämiselle ei ole vielä yhtä vakiintuneita toimintatapoja verrattuna esimerkiksi tietojärjestelmäkehityksen vastaaviin käytänteisiin. Tutkielma hyödyttää niin akateemista tiedeyhteisöä, kuin myös yritysmaailmaa vahvistamalla aiheeseen liittyvää teoriapohjaa ja käsitteistöä, sekä tuottamalla jatkokehitysaihioita alojen välisten työskentelymenetelmien yhteensovittamiseksi. Ensisijaisena tavoitteena tutkielma pyrkii tuottamaan tietojärjestelmätieteen tutkijayhteisölle hyötyä tunnistamalla ja analysoimalla yhteneväisyyksiä, eroavaisuuksia sekä muunlaisia liittymäpintoja aiheisiin liittyvien valittujen alakäsitteiden auki kuvaamisella. Tutkielma ei pyri täydellisen molemmat alat yhdistävän viitekehyksen rakentamiseen, vaan ennemminkin pyrkii stimuloimaan akateemista kiinnostusta aihepiirin jatkotutkimukseen. Toissijaisena tavoitteena tutkielma pyrkii valottamaan mahdollisuuksia tutkittavien aiheiden keskinäisiin käytännön sovellutuksiin. Tutkielma toteutettiin laadullisia menetelmiä käyttäen, haastattelemalla molempien alojen asiantuntijoita tapaustutkimuksen muodossa. Tutkielman pohjustusta varten toteutettiin erillinen kirjallisuuskatsaus. Löydökset vahvasti viittaavat yhteneväisyyksien, sekä poikkitieteellisten hyödyntämiskohteiden olemassaoloon tutkittavien alojen välillä. Palvelumuotoilijoiden hyödyntäminen osana järjestelmäkehityksen alkuvaiheita voisi esimerkiksi edesauttaa rakentamaan parempaa kokonaisymmärrystä suunnitteilla olevan järjestelmän kannalta keskeisistä suunnitteluongelmista ja järjestelmän loppukäyttäjien tarpeista, sekä auttaa järjestelmäkehittäjiä erilaisten järjestelmäratkaisuiden konseptoinnissa.

Asiasanat: järjestelmäanalyysi, järjestelmien suunnittelu, järjestelmäkehitys, palvelumuotoilu, digitaaliset palvelut, digitaalinen palvelumuotoilu

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1 INTRODUCTION

The rapidly changing modern business environment has gone through a tremendous shift from the traditional product-based economy to a more service-oriented one. This comes as a result of the widespread availability of information technology and Internet in almost all areas of modern life, which together form a globally networked digital infrastructure capable of providing services in various innovative ways (Williams, Chatterjee & Rossi, 2008).

Spohrer and Maglio (2008) argue that the need for creating value with intangible and dynamic resources, in other words, through service innovation, has grown tremendously. Service innovation provides means for raising both the quality and the effectiveness of the services, and also for fueling the overall economic growth (Spohrer & Maglio, 2008).

Prior research (Targowski, 2009) defines service economy as the increased share of service sector in all economy. Another way to describe it is through the increased servitization of products, which implicates the prevalence of service components in virtually every product of today's markets (Targowski, 2009). Gustafsson and Johnson (2006) describe servitization through a Goods-to-Services Continuum between pure services and pure goods, in which most commodities fall somewhere in between of these two extremes.

In 2015, Reason, Løvlie and Flu (2015) stated that services comprise up to 70-80 % of the economies in developed countries and the amount is rapidly growing in emerging markets as well. The digital revolution has enhanced the demand for experience economy and consumers of today expect more from the services offered by companies compared to previous generations as the market economies have trained them into it gradually (Stickdorn, Hormess, Lawrence & Schneider, 2018; Reason et al., 2015).

Stickdorn et al. (2018) point out that the service market is no longer bound to local supply, as previously the consumers searched the services mainly locally, but now with the rise of digital global service providers, they have a huge array of alternatives to choose from.

Professional services group EY's market report on global technology trends in 2021 states that the use of consumption-based business models has increased tremendously and is expected to keep on growing throughout the years to come. It is mutually beneficial for both the consumers and the service

industry, as it allows customers to get the best value out of modern technology by reducing the total cost including the up-front and switching costs to only paying for what they actually use. The companies providing the services benefit by gaining recurring revenue streams that allow them to invest the generated cash flows into new types of service offerings. (Padmos, Englund & Gerety, 2021.)

Digitalization is by far the largest global megatrend that is shaping our society and it reaches out to virtually all aspects of modern life in the developed world. The all-reaching transformational shift towards more service-oriented business-models opens new opportunities for consumer products, financial services, healthcare, media, just to name a few areas.

Digital technologies are accelerators of innovation, and throughout the first decades of the 21st century there has emerged a surge in the use of design methods to stimulate interdisciplinary service innovation (Conway, Masters & Thorold, 2017; Patrício, Fisk, Falcão e Cunha & Constantine, 2011).

Similarly, how the discipline of product design emerged at the same time with development of mass manufacturing, the emerging field of service design is similarly responding to contemporary economic, social and technical design problems and trends (Reason et al., 2015). The complexity of services requires collaboration not only between designers and business leaders, but other stakeholders as well, in order to launch services that are valuable to the consumers (Gloppen, 2011).

The service design work is beneficial especially for client organizations looking for different options in shifting into a more service-dominant approach from traditional product-centered trading. This kind of transitions can either make or break the organization depending on factors such as how the groundwork is done, is the competitor market analyzed properly, and most importantly what the customers want and need from the service.

Digitalization is a key factor on the background driving this change. Computing has in the past decades became both more mobile and more pervasive (Lyytinen et al., 2004). By building their services digital from the beginning, or by transforming existing services of the physical world to digital, companies will be able to offer their services to a much wider, global customer base. These digital services are services delivered by electronic means across multiple platforms and devices and they are highly valued by today's customers due to their convenience.

Emerging digital services are an important area of research as the design of these types of systems is not well understood and formalized, as compared to more mature fields such as system design (Williams et al., 2008). Therefore, this study is relevant for both academia and the businesses as its purpose is twofold. Mainly this study is about conceptualizing the interlinking nature of disciplines of Systems Analysis & Digital Service Design on a theoretical level.

The research unveils some of the key sub-components of these two domains and examines the conceptual dependencies, similarities and differences between them. In addition, the expert interviews provide insight on the possi-

ble interdisciplinary applications of the working methods used by domain experts in their daily work. Thus, the objective is to provide novel ideas on how systems development could benefit from service design methodologies and vice versa.

Research consists of both systematic literature review and an empirical part conducted through qualitative subject-matter expert interviews. First the domain specific literature is extensively reviewed. Source material for this study is gathered from academical publications, domain literature and from well-established, reliable online sources. Majority of the literature material is obtained using Google Scholar database. In addition, also few subject-specific well-known books are reviewed.

The body of this paper is divided into seven sections. The introduction part explains shortly the background, scope and objective of this research, by same time giving an overview of the research problem in question and the motives for conducting this study.

Second section provides a review on systems analysis and design and some of the key constructs relevant for this study. Following section examines the relevant areas of designing services by opening up relevant foundational constructs and defining the concept of digital service design.

Fourth section focuses on opening the research methodology for this paper by discussing how data was collected and how the literature review was conducted. In addition, the qualitative research methods utilized in this study are rationalized.

Fifth section opens up the findings from conducted qualitative research and sixth focuses on discussing and analyzing the results of the study. Finally, the seventh section concludes the paper by summarizing the work conducted, research implications, identified limitations for this study and ideas for future research.

The relationships between different disciplines are not a completely new discussion among academics. For instance, Kimbell (2011a) points out that there have been attempts (Edman, 2009) to explore the overlaps between design thinking and Vargo's and Lusch's (2004) service-dominant logic. Sevaldson (2017) argues that globalization and the increased need for sustainability have grown pressure on the design field to find ways to solve new types of emerging problems and follows the argument by suggesting that a promising way for this is through investigating relationships between design and systems thinking principles.

Pourdehnad, Wexler and Wilson (2011) argue that in modern business world, the principles of design thinking and systems thinking, while both are used extensively, are considered as separate ways of thinking that could benefit from synergy. They see that systems thinking could improve design thinking practice by adding the need for bringing the system as a whole to the discussion from the beginning of a development endeavor. (Pourdehnad, Wexler & Wilson, 2011.)

There have also been preliminary attempts to apply systems approach to service design methodologies (Sakaguchi & Shirasaka, 2017) and Mononen (2017) argues that design disciplines could benefit from utilizing systems thinking in unifying foundations between different disciplines, but an overall perspective shift instead of superficial application of methods and tools is needed. However, currently, there exists near to none research specifically about the relationship between early phases of systems development life cycle and the practice of service design. In addition, the concept of digital service design is vaguely defined at all in Information Systems research.

From a relevancy perspective, the topic for the research is very important, as the service economy keeps growing on an ever-faster pace. ICT enabled digital services are an integral part of modern service-oriented organizations and are expected to continue transforming the commerce also in the years to come. The organizations of the 21st century have begun to realize that the digital disruption is eating out whole companies from the markets in a matter of very short time periods. If the organizations wish to sustain their market position, they need to update their ways of working, or else they might just be the next victims of the market disruptors.

1.1 Background for this study

The emergence of digital services is on the rise. With a raising interest to innovation in services, the process of how organizations can develop new services to their customers has emerged to one of the main areas of research in the corporate world. Like services, information systems are subject to an evaluation of the adequacy of its components and their structure must be on a satisfactory level before the systems can be proposed to the intended end-customers (Morelli, 2002). This paper will discuss about the principles of designing and developing Digital Services and gives a high-level view to the practice of Systems Analysis and Design.

The focus for the research is to find a structured linking between these two domains and gain insight for possibly developing existing service design methodologies to become better. Motivation towards this topic stems from both personal interest in the emerging field of Digital Service Design, as well as from actual research gaps in the Information Systems research. The initial idea for this research topic came from my thesis supervisor Tuure Tuunanen back in the turn of the year 2019. I had previously taken professor Tuunanen's course focusing on the innovation and design of digital services, which got me initially interested in the research area. Professor Tuunanen himself is a scholar, whose research focus is at the cross-sections of information systems, software engineering, marketing and service science (Tuunanen, 2020).

In order to structure this diverse research topic as well as to present the core constructs related to topics of Systems Analysis and Design and Digital Service Design are introduced. As a starting point the foundational constructs

are introduced. Using these constructs as a foundational basis, both conceptual and empirical studies related to these areas are reviewed and opened in a coherent manner. Okoli (2015) states that in this type of studies the key theoretical contributions lie more in offering novel explanations and theoretical relationships between domains that have previously been unsatisfactorily explained.

1.2 Research problem

For all research, the work typically starts with a formal research problem setting (Hirsjärvi, Remes & Sajavaara, 2009). Hirsjärvi et al. (2009) continue that research problem setting typically consists of defining and limiting the research questions that the study aims to shed light on to.

The basis of systems development is going through a shift from systems to services, from processes to situations and from improvement to innovation (Holmlid, 2007). As Kimbell (2011b) states, emerging fields such as service design often lie between academic and professional boundaries, and they can be applied in various contexts, such as in design of systems and processes.

Service design has roots in design thinking, and it seeks to improve services or design completely new ones through a creative, human-centered process (Stickdorn et al., 2018). Simply put, service design can be seen as a means for organizations to see their services from their customers' perspective.

In this research, the main objective revolves around investigating the fundamental principles, potential similarities, differences and conceptual relationships between the disciplines of Digital Service Design and Systems Analysis and Design. This study examines these two main themes from an interdisciplinary perspective by utilizing subject-matter experts' views from more practical perspective to support the findings of the literature review.

The purpose of this paper is to generate understanding of the discipline constructs, as well as to discuss potential cross-disciplinary applications between these two domains. The motivation to formalize concepts is familiar to all fields of science, and not only to Information Systems and Computer Science (Wand & Weber, 1990). As oftentimes happens, rigorous definitions for key constructs in the studied topic may be missing (Wand, Storey & Weber, 1999). Definitions are an important part of a scientific research, as they set boundaries for the concepts, give meaning and establish norms for the use of the terms (Hirsjärvi et al., 2009). Therefore, in order to study the conceptual similarities, differences and relationships between constructs, and to build novel theory containing them, the fundamental constructs related to the domains of Systems Analysis and Design, and Digital Service Design need to be clarified in a definitive manner in order to better understand the interlinking nature of these two domains.

In addition, the study seeks to identify potential interdisciplinary applications for work phases of these closely linked disciplines on a theoretical basis, in order to ease any potential later studying of the cross-disciplinary applications

between these two domains. The research questions for the paper can be stated as follows:

1. What types of conceptual dependencies, differences and similarities exist between the domains of Systems Analysis & Design, and the methodologies of Digital Service Design?
2. Could there be interdisciplinary applications for work phases of these two closely linked disciplines?

In order to do this, the research first focuses on defining the key elements of these domains, which are summarized in Table 1. The concepts studied are here divided into six foundational areas: 1) foundations for the design process, 2) target group, 3) target group's contribution to the design process, 4) output of the design process, 5) target group members' individual perceptions on usage and lastly, 6) post-release continuous management of the designed service or system.

Key elements under Systems Analysis and Design include for example: **understanding requirements**, **user**, **passive participation**, **system**, **system use** and **maintenance**. Whereas few of the key elements included in Digital Service Design are, for instance: **understanding co-creation of value**, **customer**, **active participation**, **service**, **service experience** and **engagement**.

TABLE 1: Mapping of foundational constructs of Digital Service Design to corresponding ones in Systems Analysis and Design

Concept	Digital Service Design	System Analysis & Design
Foundation for the design process	Understanding Co-Creation of Value	Understanding Requirements
Target group	Customer	User
Contribution to the process	Active Participation (of customers)	Passive Participation (of users)
Process output	Service	System
Individual perception on usage	Service Experience	System Use
Post-release continuous management	Engagement (of Customers)	Maintenance (of System)

The background material for the study's literary review is collected from multiple sources ranging from the information technology related scientific research papers, conference papers and topic-related literature. The source material is gathered mainly from research database services, such as Google Scholar and IEEE Xplore.

In terms of finding the most suitable candidates for interviews, in this study is used the purposive sampling -method, where the main goal is to focus on particular characteristics of a population, and who are also best suitable for answering to the research questions in hand (Research-Methodology.net, 2020).

1.3 Guiding thinking philosophies relevant for the study

In today's interconnected and complex world, the ability of applying systematic approach for essentially everything is a crucial skill to possess. Systems developers and service designers alike are guided by fundamental guiding principles and thinking philosophies on how to solve complex problems that shall result with a valuable outcome. Systems thinking and design thinking are both systems of organized cognitive models for enabling practitioners of different domains to perform in complex problem solving situations (Jones, 2014).

While these two orientations have different approaches for formulating problems of design (Jones, 2014), Conway et al. (2017) state that thinking systematically on how problems are defined and solved can be seen as an advance on traditional design thinking. In this sense, both of these thinking philosophies can be seen as complimentary towards each other and therefore could be beneficial in the domains of systems development and service design alike.

1.3.1 Systems thinking

Systems thinking is a way of thinking that has evolved since 1940s (Darzentas, J. & Darzentas, K., 2014). Barry Richmond, who originated the concept of systems thinking in 1987, defines it as art and science of making reliable deductions about the behavior of an entity by developing an increasingly deep understanding of its composition (Arnold & Wade, 2015). It is a way of looking at systems holistically that focuses on the relationships of its' elements, and not only the elements themselves (Sakaguchi & Shirasaka, 2017).

Conway et al. (2017) state that systems thinking's holistic point of view means viewing any given situation or a problem as a dynamic, made up of a set of interacting system components which continuously produce feedback.

According to Daellenbach and McNickle (2005) systems engineering, and it's sub-category systems analysis both derived from this mode of thinking, are particularly suitable when the interactions between different parts of a system can be expressed in quantitative terms, as for instance in mathematical expressions.

Systemic approaches have also been applied in the domain of design. Darzentas, J. and Darzentas, K. (2016) note that whereas systems thinking can't be suggested as a complete methodology for design in general, it can be used as a grounding framework for capturing, understanding and learning about a particular design problem space.

According to Sevaldson (2017), the systemic approaches were initially resisted among the design field, because they had to compete with different already embedded and integrated approaches on which the core concepts or art and design are based upon. Sevaldson (2017) continues that potential reasons for failed attempts to apply systems approaches to design are that they may have been seen too alien for designers' or because they have been seen too in-

flexible and/or dogmatic. Systems thinking is also commonly critiqued due to its tendency of getting stuck in analysis on its quest for understanding the complexity of a problem (Conway et al., 2017).

1.3.2 Design thinking

Moritz (2005) describes design as a practice of translating a problem into a solution for a certain group of users. He continues that design can be used as a mean to provide more holistic understanding on complex issues such as what drives people in different areas of life, economy and society (Moritz, 2005).

Design thinking is a user-centered and iterative approach for problem solving and innovation, that applies design principles beyond of mere tangible objects (Ryan, 2014). It is a holistic way of thinking, or an ideology, which is based on continuous ideating, and where the way of work does not isolate ideation and design principles as their own separate phases, but work as an integral part guiding the work in general.

Conway et al. (2017) describe design thinking to be exploratory by its nature, as solutions under work are iteratively developed, prototyped and tested to gain continuous. Whereas pure design skills have traditionally been regarded as part of the commercial design, design thinking has also been seen as useful in strategic management settings (Sevaldson, 2017).

Key area for design thinking is that all design is targeted towards people, the end-users, customers and other stakeholders (Ryan, 2014). Ryan (2014) continues that design thinking focuses on humanizing processes of change and always begins with considering of those stakeholders who shall be mostly affected by the design. Reason et al. (2015) state that practitioners of design thinking always start with the assumption that a perfect solution exists for any given problem, but it hasn't been invented yet.

The philosophy behind design thinking combines empathy, creativity and rationality and embeds them into the organizational culture, and therefore also to the practice of service development. In the context of system's development domain, design thinking is linked to the agile development methods, as both practices emphasize small iterations to approach problems.

Kimbell (2011b) states that design thinking can be described as an iterative process that starts from generating insights from the end-users and moves onwards to idea generation, testing and eventually implementation. According to Conway et al. (2017) one of the most widely recognized ways to deploy de-sign thinking is the Double Diamond method developed by the Design Council (see Figure 1).

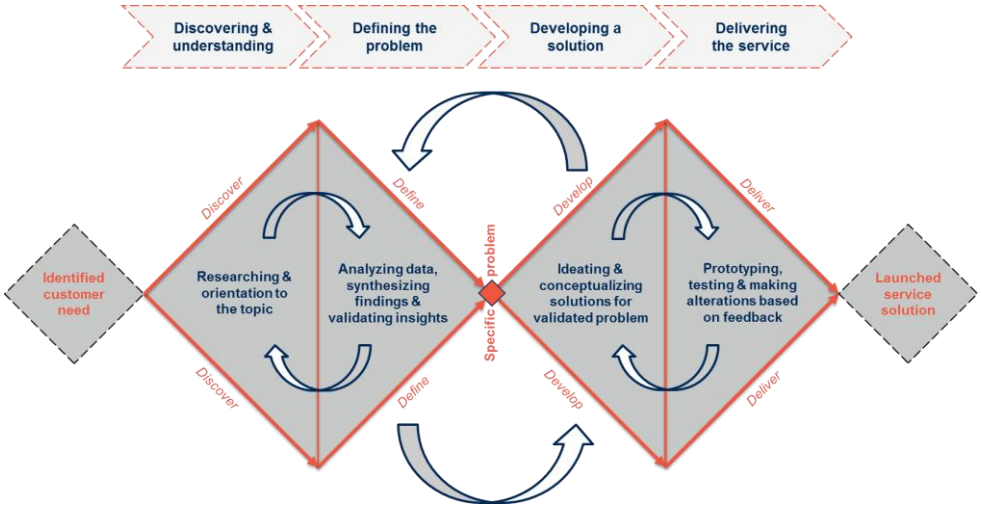

FIGURE 1: Iterative service design methodology, researcher's adaptation of British Design Council's 2004 Double Diamond framework (Design Council, 2019)

The Double Diamond method helps to uncover a problem through collaborative and iterative effort and helps to generate ideas that could ultimately be formed into products, whether digital or physical; processes or entire services (Conway et al., 2017). The methodology is divided into four separate phases: 1) discovery phase; 2) definition of a problem; 3) development of a solution; and 4) delivering the service.

Double Diamond methodology always starts with an identified customer need which builds a foundation for any design project. Together with the initiation of the project, the discovery phase includes the steps of orientating to the topic at hand and conducting background research on it.

Following the discovery, based on the generated understanding and the identified customer needs, the second phase focuses on defining the actual design problem by analyzing the gathered data, synthesizing potential findings and by validating any risen insights. All this aims in formulating a specific design problem to be solved.

Thirdly, the methodology continues into ideating and conceptualizing potential solutions for the validated design problem. Development is iterative by its nature, as is the whole methodology, which means that development may take steps back in case the problem at hand needs to be defined more in detail. The conceptualization of the solution produces a testable prototype of the service solution, which is furtherly tested in the fourth phase.

Testing is conducted in collaboration with the intended service provider and the identified end-users. Alterations to the developed service solutions may be made based on the feedback and observation during the testing activities. When a satisfactory level for delivering the service is reached, it is launched.

Conway et al. (2017) note that while design thinking provides a solid process for idea development, it lacks to recognize that if the systemic complexity

and context-relevant social dynamics are not taken into account, even the best ideas may be left unused. By itself, the design-led approach provides strong insights on users, but if the domain complexity and internal power dynamics are not considered, the systemic understanding and overall impact are left uncovered (Conway et al., 2017).

2 SYSTEM ANALYSIS AND DESIGN

Systems Analysis, that is often also considered as an integral part of Systems Engineering, and therefore Systemic Thinking as well, has grown to its own discipline from Bertalanffy's (1969) General Systems Theory. Traditionally the field of Systems Analysis and Design can be described as a series of processes undertaken in order to enhance the use of computerized information systems within business environments through analyzing current and eventual users of the systems and their needs in an organizational setting (Kendall, J. & Kendall, K., 2014).

To understand the process of System Analysis and Design as a whole, the related concepts need to be first broken into parts. This section opens up few of the most essential terms for this study. First of all, there are various authoritative definitions for the term *system* itself in the field of information systems science.

According to Institute of Electrical and Electronics Engineers (IEEE) Standard 1220-1998, a system is "*a set or arrangement of elements and processes that are related and whose behavior satisfies customer/operational needs and provides for life cycle sustainment of the products*". The International Standardization Organization defines systems as "*combination of interacting elements organized to achieve one or more stated purposes*" (ISO/IEC 15288:2008). Hence, a system could be defined as a set of interacting components that work in synergy to perform practical functions.

These beforementioned inputs and internal system elements consist of people operating the system, hardware, software, facilities, processes, documents and policies, that are all required to system function as intended, and to produce system outputs.

The basic principle of any system is that they are more than just a collection of their parts (Meadows, 2008). Hence, the value added by the system as a whole, rather than by its individual components alone, is primarily created through the interconnected nature, the relationship among them and the common goal they have.

Although not all systems have an obvious goal to achieve, common to all systems is that they produce some sort of predefined output, as for instance: compute complex calculations, or support organizational business functions in their specific operations.

Information Systems Analysis and Design, sometimes abbreviated as ISAD, is arguably one of the core and most classical fields of research in the field (Haki, Blaschke, Aier & Winter, 2019). Davis and Yen (1998) describe information systems as sets of hardware, software, data, people and processes, which all together intend to provide right information to the right user at a right time. The discipline literature defines information systems as distinctive types of information technology enabled systems, which have a clear goal of enhancing the effectiveness and efficiency of the business environment where they are going to be implemented (Hevner, March, Park & Ram, 2004). Information systems consider not only the technology within the system, but the symbiotic effective use of data, hardware, software, people and processes. Therefore, it is crucial to consider all these areas in the scope when initiating an information systems development endeavor.

Within the field, there have been made some distinctions for dividing different types of information systems according to their intended use. For example, Chen and Vargo (2010) state that in the information systems literature, many use the term "service system" in order to emphasize the explicit service-orientation of the information system.

Kenneth and Julie Kendall (2014) describe Systems Analysis and Design to be an approach for systematically identifying problems, opportunities and intended objectives of the developed system, and to also analyze the organizational information flows between the systems and their human-users. All this provides facilities for describing real world problems to problems that information systems can help to solve (Wand & Weber, 1993).

Information systems analysis focuses on the activities in the early phases of information systems development endeavors that aim to identify and document organizational requirements for the information system under development (Iivari, Parsons & Wand, 2006, as cited in Haki et al. 2019).

Information systems design focuses on the activities following the analysis phase, that revolve around translating these set requirements into logical information system design attributes, so that the system can function as intended in its planned environment (Gregor & Hevner, 2013, as cited in Haki et al., 2019). Therefore, it can be summed up that information systems design focuses on defining the overall system architecture, its components, interfaces and means for processing data within, that the system can meet the requirements set for it during earlier phases of the software development life cycle (Iivari et al., 2006, as cited in Haki et al., 2019). By designing a system that meets the requirements, the system provider can more efficiently manage its configuration of people, technology behind the service and all the other resources.

Systems development is a continuously evolving interdisciplinary field of engineering that revolves around the topic on how to design, build, integrate

and manage complex systems throughout their product life cycle. Development of information systems is a complicated effort, which is why they require significant investments in time, effort, and economical sense (Whitten, Bentley & Dittman, 2005). As systems development endeavors may realize costly if conducted haphazardly, the practice of systems analysis and design aims to structure the processes in a way that development could run in a structured manner (Kendall, J. & Kendall, K., 2014).

A traditional approach for systems development endeavor is to sequence the activities into a waterfall model, where each phase follows another in the efforts of pursuing a finished system (Alexander & Gossett, 2009). The model is referred to a waterfall, because of visually represented is suggests the work phases to cascade from step-to-step like a waterfall (Davis & Yen, 1998), as illustrated in Figure 2.

Typically, the phases all together are referred to as a System Development Life Cycle (SDLC), which as a term matured in the systems literature between late 1950s to 1970s (Loughman, Fleck & Snipes, 2000). The System Development Life Cycle provides a systematic, phased approach for modeling the steps from initial planning and project initiation to the end-of-use, also see Figure 2. The abbreviation SDLC can also refer interchangeably to Software Development Life Cycle, but it is oftentimes considered as a subset for the former.

The goal of dividing the system development to smaller sequences aimed to structure the processes and help to build specialized working methods for each individual phase, and to decompose tasks to easier to achieve, control and manage (Loughman et al., 2000; Davis & Yen, 1998).

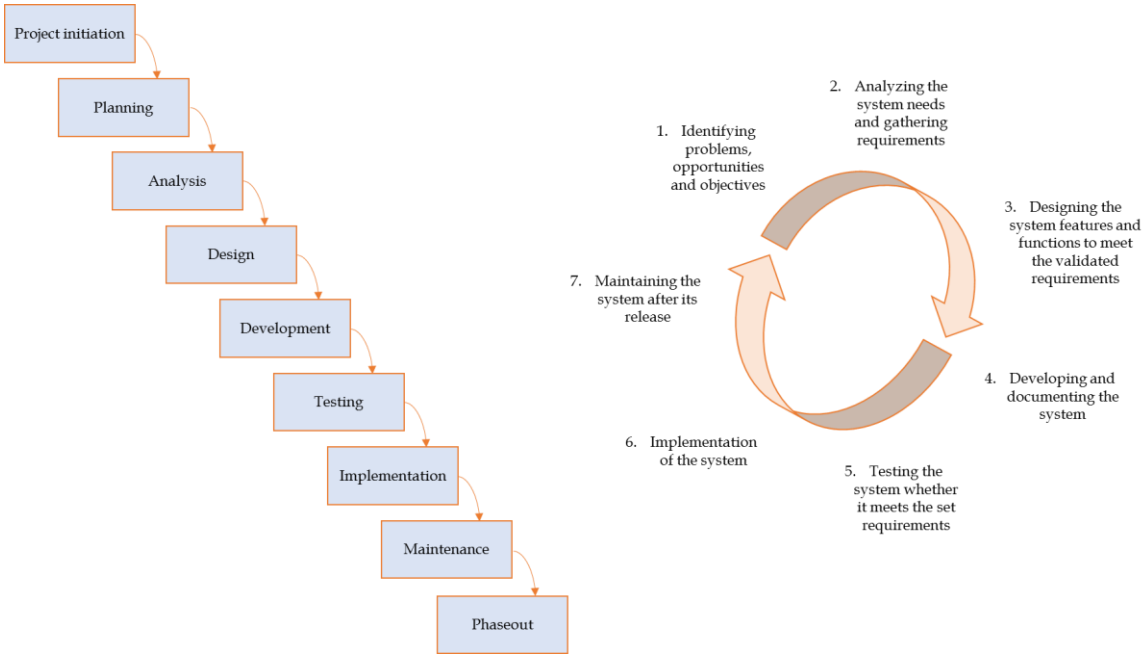

FIGURE 2: Typical waterfall development model, next to a representation of an iterative Systems Development Life Cycle (SDLC) by Kendall, J. & Kendall, K. (2014, pp.32)

Among the field of Information Systems, there is not a common consensus on how many separate phases are included to System Development Life Cycle (Kendall, J. & Kendall, K., 2014), but in a more higher-level, the life cycle can be divided to two distinctive main areas, the steps preceding the system release and the maintenance of the system after its implementation. In this study, we are mainly focusing on the earlier phases of the System Development Life Cycle: Analysis and Design.

Kendall, J. and Kendall, K. (2014) continue by noting that even though phases are presented discretely, they are rarely accomplished as separate, but instead activities from different phases of the life cycle can occur simultaneously and they be repeated if seen necessary.

As with any system development initiative, the first step is always identifying and defining the problem that the system is intended to solve (Davis & Yen, 1998). The project initiation usually stems from either direct customer need or from an input from market studies that reveal general market needs for a specific type of information system.

All system development endeavors start with an initial project initiation phase, where the scope, goals, schedule and budget are planned. The initiation aims to determine the general frame for work to be done and the goals to be achieved with the use of the system. (Whitten et al., 2005.)

After the initiation of the project and planning activities included in it follow the phases of Systems Analysis and Design. Kendall, J. & Kendall, K. (2014) describe Systems Analysis and Design as phases of the systems development initiative, which are used to analyze, design and implement improvements with the purpose of supporting the systems' intended users in their work and the overall functioning of the business environment. The work conducted in the initial Systems Analysis and Design serves to set stage for the development endeavor and bounds the problem to be solved. The proper application of System Analysis and Design is in an essential role for making the system development project successful (Ramakrishnan, 2012).

It is common for many system development projects to fail because the implementation of the system has been pursued without a holistic understanding of the reason for the system in the first place (Ramakrishnan, 2012). Many systems have been rolled through the development life cycle, only to fail because users have not received the functionalities expected, which has ultimately led to time-consuming and frustrating workarounds to make the systems to meet their utilitarian needs (Keil, Mann & Rai, 2000 as cited in Tuunanen & Peffers, 2018).

Valkonen, Lindström, Natunen, Isoviita and Tuunanen (2015) state that regardless of the systems nature, whether it is of business or leisure use, both the utilitarian and hedonic characteristics need to be considered when developing a new information system. They point out that before the hedonic needs can be addressed, a satisfactory level of utilitarian aspects is to be fulfilled. (Valkonen et al., 2015.)

After the initial planning has been conducted, the System Analysis phase focuses on converting the project goals into defined functions and operations of the system by studying expectations for the system and examining its parts and their interrelations. In addition, System Analysis intends to provide the development team a more holistic understanding of the different needs for the system (Whitten et al., 2005). System needs are studied within the business problem domain by collaborating with the system's intended end-users in order to specify and validate the expectations and requirements set for the system. Typically, the systems logical elements such as the data types, processes and system boundaries are defined during the System Analysis (Davis & Yen, 1998).

During the analysis phase, it is also important to prioritize which of the set requirements are seen the most crucial, since development of information systems is a complicated effort, and in many cases the schedule and budget may be insufficient to accomplish all that is desired. In this sense, the System Analysis may also reveal potential needs for revising the set scope or goals during earlier phases of the endeavor (Whitten et al., 2005). Therefore, the System Analysis has an important role in preventing failure of the development initiative and it provides input on whether the project should proceed or be cancelled before investing any more resources to it.

Following the System Analysis phase, the next step is System Design, which aims to define how the problem will be solved (Davis & Yen, 1998). During the System Design, the focus shifts towards specifying the technical, computer-based solutions for meeting the business requirements identified during Systems Analysis (Davis & Yen, 1998; Whitten et al., 2005). System Design accounts for grouping the intended data elements to physical data structures and defining the hardware components that support the system to be developed (Davis & Yen, 1998). Design phase also establishes an architecture for the system, which aims to ensure that all system components are identified and allocated in a way that the system can run on the desired performance level (Nikolaidou & Alexopoulou, 2008). The overall goal for System Design can be hence summarized as describing the system's desired elements in a way that the development team may develop and implement the system with minimal additional input on its design.

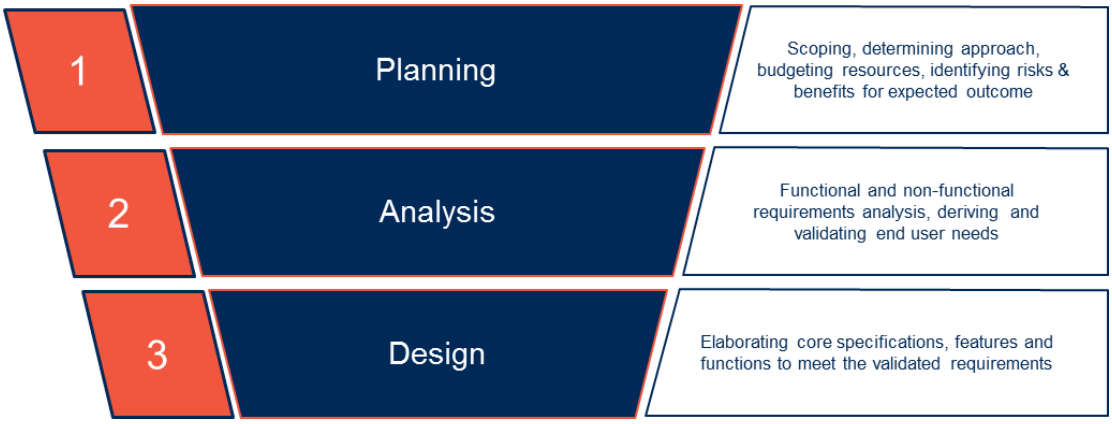

FIGURE 3: Typical starting points of a systems development endeavor

Even so, that the scope of this research focuses mainly on the earlier phases of the systems development (illustrated in Figure 3), also the latter phases of the development life cycle are shortly introduced here as well.

Systems are created during the actual System Development phase, where for instance the systems are coded, databases are initialized, end-user documentation is prepared and the required hardware is selected and ordered (Davis & Yen, 1998). After the system is developed, follows the System Testing, where it is ensured that the system operates how it was designed to operate. Testing is a multi-phased set of activities which aims to fix any remaining problems within the system. Once the system has gone through final tests, it is ready to be released to the users through System Implementation. (Davis & Yen, 1998.)

Following the release of the system, begins the maintenance phase of the life cycle. The maintenance is not per se a part of the actual development process, but it aims to take care that the system keeps functioning at an acceptable level throughout its planned technical lifetime (Davis & Yen, 1998).

All systems will eventually reach the end of their technical lifetime, after of which the support of the company providing the system will also end. Reasons for obsolescence may stem for example from a change within the business environment or from an implementation of a newer, more efficient system. The systems still continue to exist even after this, but as their users no longer continue their use, eventually the maintenance activities are no longer continued, and this can be seen as the terminus of a system life cycle.

2.1 Understanding requirements

Identifying, defining and specifying the best features for new Information Systems has long been recognized as an important problem to solve (Neill & Laplante, 2003; Ravid & Berry, 2000 as cited in Tuunanen & Peffers, 2018).

One of the key activities of any successful Systems Analysis and Design, is in capturing the functional and non-functional requirements for a system (Loughman et al., 2000). Requirements gathering, or *requirements engineering* typically starts early on the software development life cycle and aims in understanding the organizational business needs, and then derives the requirements to be set for the information system from them (Soffer, Golany, Dori & Wand, 2001).

Flores, Mora, Alvarez, O'Connor and Macias-Luévano (2009) point out that the overall goal for requirements gathering is to elicit valid users' requirements as they have direct, strong impact on the quality and the cost of the finalized software product. They continue stating that requirements engineering can be seen as the most important stage of the System Development Life Cycle, as any error made during it, and discovered later on, will typically cause major cost overruns, delays and unrealized requirements (Flores et al., 2009).

Institute of Electrical and Electronics Engineers (IEEE) defines system requirements as capabilities that need to be met and/or possessed by a system or system component to satisfy a contract, standard, specification, or other formally imposed document. The set of all requirements forms the basis for subsequent development of the system or system component (IEEE, 1990).

ISO/IEC 25010 (2011) standard on Software Product Quality Requirements and Evaluation lists eight distinctive product quality characteristics that are furtherly divided to 31 sub-characteristics. The main characteristics include: Functionality, Efficiency, Compatibility, Usability, Reliability, Security, Maintainability and Portability.

By Functionality is meant "*attributes that bear on the existence of a set of functions and their specified properties. The functions are those that satisfy stated or implied needs*." Reliability requirements revolve around attributes that bear capability to perform under stated conditions. Usability focuses on attributes that base on the individual's assessment of use. Efficiency requirements balance between the performance and the resources required of operating. Maintainability requirements care for the efforts needed to make modifications whenever needed. And lastly, Portability requirements focus on the abilities of software to be transferred from one environment to another. (ISO/IEC 25010, 2011.)

In a broader sense, all requirements can be divided broadly into two categories: *functional* and *non-functional*. Self-explanatory, the functional requirements are the specifications that specify systems' overall or individual system component's intended functions. Non-functional requirements consider more on matters that have no functional specifications determined but are complimentary taken into account from the intended systems user's acceptance point of view. Therefore, it can be argued that the efforts made during early phases of systems development endeavors in regards of setting non-functional requirements, contribute to higher-quality systems from end-user's point of view.

Soffer et al. (2001) state that as software are usually described in the terms of functions, data, queries and transactions, there can be substantial incompatibilities in matching the software needs with the business requirements described in business concepts. This incompatibility obviously requires the pres-

ence of subject-matter experts who understand both worlds and can work as a translator in between.

2.2 System users and their participation

In the discipline of Information Systems Science, the *User* is simply put the person who will act as the end-user of a product, a service or a system, and through it captures, validates, enters, responds to stores or exchanges data and information (Whitten et al., 2005). Kendall J. & Kendall K. (2014) argue that there is ever-and-ever more emphasis on working with the intended system users; on performing background analysis on their businesses, the problems they face in their daily tasks and objectives.

User-centered design is a systems development approach that supports in the user-centered activities that aim to ease the use of the system, or to add value to intended users (Moritz, 2005). Tuunanen, Myers & Cassab (2010) state that whereas previously users of information systems have been conceptualized as being concerned mostly on the overall effectiveness of the system and its influences on their work performance, the focus on designing and developing Information Systems of the future should take in to consideration the general shift on thinking that argues in favor of mutual value co-creation (Vargo & Lusch, 2004) between the service providers and their consumers.

User involvement and participation of the user have long been a key variables in measuring the successfulness of an information system development endeavor (Barki & Hartwick, 1994 as cited in Kendall, J. & Kendall, K., 2014). Hence, the role of systems analysts participating in the planning and designing of the information system, need to consider the needs of the intended system users (Kendall, J. & Kendall, K., 2014).

According to Cavaye (1995) the terms user involvement and user participation have been used somewhat interchangeably in the Information Systems literature, but for example Barki and Hartwick (1994) have made clear distinguishment between these two concepts. *User participation* is defined as a set of activities and/or operations conducted by the users during the system development phase, whereas *user involvement* as a concept revolves around one's subjective psychological state influencing system user's perception and further to the system success (Barki & Hartwick, 1994; Cavaye, 1995).

Despite that for many years user participation was considered to have clear positive influence on the system development endeavor's successfulness, also critical views have been presented. For example, Cavaye (1995) argues that the link between participation and development success is more complicated, than a clear causal relationship, and that user participation has been not guaranteed to contribute to the outcome of the project. Cavaye (1995) continues that whereas the users contribute by making sure that the systems shall conform to their needs, the system specialists contribute by ensuring that good use consists

of technological opportunities and therefore, the user-analyst relationship affects to the overall effectiveness of user participation.

User participation has been studied also in online community settings (Malinen, 2015), where participation has been noted as a key factor in creating successful online communities. Malinen (2015) points out that user participation can be characterized two types of community participation, active and passive. Actively participating members of an online community contribute and create majority of the content, whereas the passively participating members mainly take advantage of the benefits offered by the community. Malinen (2015) continues that the motivations behind the passive and active members are an interesting research topic, as for instance how to activate more passive members to contribute more. Thus, user participation can be seen as an instrument for community maintenance, which is why user actions are encouraged for their financial impact to the companies hosting the online communities (Malinen, 2015).

2.3 Use of a system

As stated previously, the people who use systems, are defined as system users. Therefore, the process where the system users operate the system, is defined here as *System Use*. DeLone and McLean (1992) state that the use of a system has traditionally been one of the key success measure in the empirical research of information systems, and that the concept of use can itself be measured from several different perspectives.

By default, a specific purpose for a use of a system tends to reflect a higher level of system utilization (DeLone & McLean, 1992). System Use is also highly dependent on the user's perception of system's impact on his/her performance (Robey, 1979). People tend to either use a system or choose not to use it based on the beliefs whether it shall help them perform a certain task more efficiently (Davis, 1989). Davis (1989) describes this dimension as the *perceived usefulness* of a system. On the other hand, even if a system is seen useful by its users, another contributing factor to regarding system use, is whether the benefits of the system outweigh the effort of using that particular system. Davis (1989) describes this concept as the *perceived ease of use*. According to Vinerean (2013), the perceived ease of use is heavily dictated by what the system is capable of doing and what it allows its users to do.

High perceived usefulness and perceived easiness of system use both positively contribute on system user's relationship towards the used system, and its' acceptance among users, in other words to the *user acceptance* (Davis, 1989).

Users' satisfaction with a system's value, functionality and usability typically indicate the success for the system and its' related services (Tuunanen & Peffers, 2018). Junglas, Goel, Ives and Harris (2019) back this up by stating that satisfaction is considered as one of predominant predictors for further intentions of technology usage and re-purchase behaviors.

Usability of a system is an exceptionally complex area to study, and this has taken the system designers and scholars of the domain alike to take steps towards the behavioral and social sciences (Buchanan, 2001). In case the users find dissatisfaction in the use of a system, the users are more likely to discontinue their use of the system (Scamell & Szajna, 1993). Therefore, it is seen crucial that when conducting early phases of the system development, mere objective performance of a system should not be seen as the only indicator of its effectiveness. Scamell and Szajna (1993) point out that the perceptions of the system users are an important thing to consider, much alike how the marketing professionals study both the objective performance of a product and how the consumers perceive its performance.

2.4 Maintenance of a system

System Maintenance is the final step of system development life cycle, even though it does not per se is longer a part of the actual development process. International Standardization Organization defines System Maintenance as *the process of modifying a system or component after delivery to correct faults, improve performance or other attributes, or adapt to a changed environment* (ISO/IEC 14764:2006, 2006). Maintenance plays an important role in the keeping systems operational after they have been implemented (Davis & Yen, 1998).

System maintenance is a key component in lengthening the overall lifespan of a system. Thus, it is crucial to put thought into maintenance already in the early phases of the systems development life cycle.

In his study on evaluating information systems development approaches' potential influence on maintenance, Dekleva (1992) states that as overall time spent on the maintenance activities of an operational system is typically the predominant component of maintenance cost structure, which would implicate that already on the early phases of the development, ways to reduce maintenance time should be considered. Initial planning of the maintenance addresses to these actions and supports in efforts toward minimum life cycle cost (ISO/IEC/IEEE 15288:2015, 2015).

Planning of maintenance activities starts early in the development life cycle. The initial requirements for system maintenance need to be formally defined during stakeholder requirement definition process, as they set frame for maintaining the operational capabilities of the system. These requirements include, but are not limited to, maximizing systems operational availability, preserving the operating potential through scheduled maintenance and determining whether outsourcing can be utilized in maintenance activities. (ISO, 2015.)

System's maintenance plan needs to specify both the scheduled, preventive servicing tasks and their intervals, as well as the unscheduled, corrective servicing. The objective of the maintenance is to keep the system functioning as expected until the eventual phasing out of the system, as even the most sophisticated systems will eventually become obsolete and shall be replaced.

3 DESIGN OF (DIGITAL) SERVICES

Concept of service itself has a multitude of definitions depending on the context. The well-established online dictionary Merriam-Webster (2020) defines the term *service* in its most basic principle as "*a function of serving others*", or as a "*contribution to the welfare of others*". Kotler and Armstrong (2010) refine the definition by describing services as any activity that one party can provide to another, that is, essentially intangible and does not result in the ownership of anything. When put into the context of modern IT-enabled service-oriented world, widely used ITIL framework (Information Technology Infrastructure Library) defines services as "*means of delivering value to customers by facilitating outcomes customers want to achieve, but without the ownership of specific costs and risks*" (Adams, 2009).

What is crucial to understand regarding all types of services that they cannot be controlled in a way like tangible products. Tangibility is typically used as a characteristic which describes the ability of entity to be perceived by the sense of touch (Williams et al., 2008). Shostack (1982) states that whereas products are tangible objects that exist both in time and space, services are consisted of sole acts of processes, and therefore exist in time only. She continues that services can't never be possessed like products, as they can only be experienced, created or participated in (Shostack, 1982). Polaine, Løvlie and Reason (2013) describe the distinctions between products and services in following characteristics:

- It's harder to inspect the quality or flaws of a service, than a physical product.
- Services can be abstract or invisible, whereas products have physical appearance.
- Services need to deliver a robust customer experience, which means that when designing them, they must constantly be able to adapt to changes within the system.

The value of the service is always defined by its' users, not by its' providers. It is a fundamental part for understanding the service concept, that the services only have value if someone uses them.

3.1 Service design

Already in 1982, Shostack introduced tool called Service Blueprint as a method for integrating design principles to the products and services (Stickdorn et al., 2018). Service blueprints were seen as tools to help encourage creativity and problem solving at the early phases of planning and designing a service (Shostack, 1982). While the origins of the service design practice lie in the domains of marketing and management disciplines, the contemporary community around Service Design arises from design schools (Stickdorn et al., 2018).

In 1991, Service Design as a term was first introduced by Michael Erlhoff and Birgit Mager of Köln International School of Design (KISD), which was the first university world-wide to offer a program for service design (Moritz, 2005). The basic concept in service design revolves around principle, which states that services have similar quality problems that can be addressed to by utilizing same kinds of design principles, as has been traditionally used for improving products (Moritz, 2005). In other words, Service Design is concerned with holistically applying design principles to the design of services (Holmlid, 2007). It also focuses on exploring the underlying problems of the intended customers before starting to come up with any solutions (Hofemann, Raatikainen, Myllärniemi & Norja, 2014).

When crowdsourcing for a definitive definition for the practice from total of 150 service design professionals, Megan Erin Miller came with an outcome that summarizes the practice to help organizations to see the services they offer from a customer perspective, by balancing between the needs of the customers and the needs of the service providing business, and ultimately aims for creation of seamless and high-quality service experiences (Stickdorn et al., 2018). Service design has its roots in design thinking, and it revolves around creative, human-centered process for both improving existing services and designing completely new ones. Through close collaboration that engages both the customers, intended end-users and the service delivery team, service design helps businesses to build a holistic end-to-end understanding of their services and potential meaningful improvements. (Stickdorn et al., 2018.)

The field of Service Design has evolved throughout the last few decades from a niche design discipline to a more accessible and comprehensive way to tackle customer and organizational design challenges in virtually all areas (Reason et al., 2015). Service Design appears to have become the major paradigm for the whole design domain, and it has been influencing the evolution of design approaches at all levels of the discipline (Darzentas, J. & Darzentas, K, 2016).

Reason et al. (2015) still argue that service design is still in many ways under-recognized and undervalued by businesses.

Stickdorn et al. (2018) extend the original principles of service design to six main areas. Firstly, service design is at its core, **human-centered**, meaning that it needs to consider the experiences of all the people potentially affected by the service, and not just the end-users. Secondly, the practice is **collaborative**, which implicates that stakeholders from various different backgrounds should be actively participated to the process of designing a service. Thirdly, the process of service design is always **iterative**, so it employs an experimental and exploratory approach, which progresses in iterations towards the end-result. Fourthly, the service design process should be seen as **sequential**, meaning that during the process the designed service is formalized and visualized as a sequence of interrelated actions. Fifth principle is that the working process is **real** in sense that the ideas are prototyped in reality, and the otherwise intangible value is transformed to be evidenced as a means of physical and/or digital reality. Lastly, Stickdorn et al. (2018) mention the process to be **holistic** in a way that the needs and wants of all stakeholders concerned are addressed throughout the service delivery and across the business providing the service. Therefore, it addressed the whole value ecosystem and provides benefits not only to the intended end-user of the service, but as well to other businesses in the market and internal partners of a service organization (Stickdorn et al., 2018).

The theoretical roots of Service Design and user experience design (UX) share common core concepts, but they differ in a sense that user experience design traditionally focuses only on single digital products, applications and customer touchpoints, (Law, Lu, Roto & Väätäjä, 2018; Roto, Lee, Mattelmäki, & Zimmerman, 2018) whereas Service Design considers more in-depth values and needs of the service customers as well as the background activities that enable the designed services to be delivered as intended. Therefore, the practice considers not only how the services are experienced, but also the actual value propositions for the customers, the underlying service processes and the entire business models of a service organization (Stickdorn et al., 2018).

In general, service design revolves around understanding the values and preferences of the targeted customer base. The customer's point of view is referred to in practically every touchpoint of a service journey (Gloppen, 2011). Engaging customers at the right time and anticipating the customer expectations throughout the customer journey is important, therefore discovering these engaging moments, or customer touchpoints are crucial in delivering customer experience excellence (Reason et al., 2015).

A common method for understanding the customer's service journey holistically, is through a customer journey map, which is a chronological description of interaction points that the customer goes through while using or consuming a service (Stickdorn et al., 2018). These interaction points are steps, where the service user is required to complete action while using the service. For instance, a webstore selling clothing could ask their customers to tell about their first impressions when opening the site and continue all the way to the

point where they are confirming a purchase. If at any time during the customer journey the user feels frustration or finds the service inadequate, the provider wants to know these pitfalls, that they may make the necessary amendments that increase the chance of a successful sale.

Stickdorn et al. (2018) state that the process of service design can be divided to three distinctive phases: 1) research activities, which aim to generate knowledge and insights; 2) ideation activities, where a vast amount of potential opportunities are filtered to few promising service ideas; and lastly, 3) prototyping and implementation, where the potential solutions are explored and built to be furtherly evaluated to support decision-making process.

Service prototypes can be seen as staged simulations of processes affecting the customer experience, that replicate parts of a designed service either from the front-end, that is visible to customers, or from the back-end. The term prototype itself derives from Greek language word *prototypon* and can be translated as "early form of something". (Stickdorn et al., 2018.)

Prototyping is used mainly for developing value propositions, as for instance to evoke or stimulate customers to express their perceived value (Edman, 2009). Additionally, they can be used as means for communication, or to enhance collaboration within the design and development teams during different activities of a service design process (Stickdorn et al., 2018).

Hofemann et al. (2014) point out that whereas evaluative prototypes that are common in software and usability engineering, their focus is more on exploring the problem instead of evaluating potential solutions. Hofemann et al. (2014) continue that while in software engineering, the design artifacts revolve mostly around technical specifications, in service design the artifacts cover more holistically the customer experience and may take variety of forms that can help better to understand of the problem at hand, and the potential solutions to it. Service design has not been used extensively to design digital services, which is why service design does not have a widely used methodology for implementation of a software. Therefore, service design is required to be combined with software development methodologies to actually implement service concepts. (Hofemann et al., 2014.)

3.2 Digital service design

Digital technologies have driven a disruptive change in the service sector (Reason et al., 2015). Digital services are services that are provided and consumed through digital appliances and through information networks. Williams et al. (2008) define them as activity where one party provides a benefit or utility to another through digital transactions. Therefore, the party providing the service in this context is the digital service provider and the party receiving the service is simply put the customer of the service providing organization.

Williams et al. (2008) state that while digital services may start digitally, it still does not imply all interactions in the process to be limited solely digital.

They also note that while digital services may be delivered only through single digital transaction, they oftentimes are provided in either groups of transactions or as recurring transactions (Williams et al., 2008).

Digital services provide value for consumers using them, and also to the other service providers related to the core service within the same service ecosystem. Individual service providers do not necessarily need to provide complete services, but they can provide smaller parts of a larger service system. (Immonen, Ovaska, Kalaoja & Pakkala, 2016.)

By digital service design, this study applies the well-established concept of service design to the domain of purely digitally provided services. Digital service design has an important objective in capturing the customer attention and trying to maintain customer satisfactory, that the users would keep on using these multi-platform services in way that they get the most value out of it.

Different ways for conducting digital service design can include for example website maps, schematics, mock-up test versions, detailed documentation and specifications for a service, sketches, presentations and models created with computer aided drawing (Newman & Landay, 2000).

It can be difficult for the digital service developers to find out the actual outcome and usage for their service, since it may end up serving totally other interest group than it was intended to (Tuunanen et al., 2010). This would implicate that the design process continues through the whole life cycle of a service, not just the phase before implementing it.

3.3 Understanding co-creation of value

Holbrook (1994) claims that customer value represents the "*fundamental basis for all marketing activity*." Vargo and Lusch (2004) argue that in the emerging service-centered logic, customers should always be seen as co-producers of the service itself.

The development of services may or may not be linked to a physical product. Unlike the consumers of physical products, service customers are closely involved in the service production process (Gustafsson & Johnson, 2006). The value itself is co-created with the customers of the service and the as the service providers cannot complete the value creation process only by themselves.

Lusch and Nambisan (2015) define value co-creation as the processes and activities that underlie resource integration and utilize different actor roles within a certain service ecosystem. Value co-creation takes account how value is created in collaboration with all the stakeholders of a certain service system. Vargo and Lusch (2008) state that value is co-created through combined efforts of the service provides, customers, employees, stockholders and other entities related to the exchange of the service, but in the end the value is always determined by the beneficiary, in other words, the customer (Edman, 2009).

Grönroos and Voima (2013) see customers' role as an important part of the value creation and that service providers should because of this increase the interaction between each other. Perceived value of the service depends of the beneficial value-in-use for the customer, not to the producer itself, but they are in the role of making value propositions. Perceived value as a term represents the difference between the benefits received through consumption of a service, and the associated costs a service consumer encounters (Vinerean, 2013).

On top of the monetary investments made, the associated costs could include also non-monetary costs such as time, energy and stress (Vinerean, 2013). Customers value the convenience, where the beforementioned non-monetary costs are reduced to minimum. For instance, the service provider may provide non-monetary value to the customer by lessening the effort and time required to perform different tasks within the service domain.

Tuunanen et al. (2010) have proposed a conceptual framework that illustrates how consumer value is co-created through consumer's requirements and system value propositions and to customer value drivers. Systematic side of the value creation process takes account *construction of identities*, *social nature of use of the service* and the *context of the use*. As for the customer side of the process, elements include *participation into the service production*, *experiencing the service process* and lastly the *goals and outcomes* for using a service. (Tuunanen et al., 2010.)

In their studies, Grönroos and Voima (2013) point out that the actions of the service provide may also make a negative turn to the value creation process. Vartiainen and Tuunanen (2016) describe the duality of value creation and destruction as opposing phenomena. Lintula, Tuunanen and Salo (2017) have conceptualized the process of value co-destruction, identified relevant key components and categorized these into three interrelated dimensions: *Orientation*, *Resources* and *Perceptions*.

The orientation dimension includes the intentions and goals evolving throughout the service process. The resources dimension considers that value co-destruction may stem from lack of resources, which may lead to misuse or loss of resources during the service process, that eventually can lead to attempts to restore the lost resources. Lastly, the perceptions dimension considers the initial expectations for the service, as unrealistic prior expectations may lead to insufficiently perceived value throughout the service process or to incongruence of the applied practices during service consumption. (Lintula et al., 2017.)

3.4 Service customers and their active engagement

Customers can be simply defined as individuals or organizations that purchase products or services from a market actor. There can be distinction made between customers and consumers, as consumers can be seen as actors who use the service or products, but do not necessarily at the same time are the customers who are paying for them (Moritz, 2005).

The motivation for customers to use services stems from a perceived need that they wish to fulfill (Reason et al., 2015). While in product-centered markets, the manufacturers do not generally have contact with their customers, the service providers typically shape their services with the service users, who therefore are actually participants in the production process (Morelli, 2002). Hence, applying a same mindset for designing a service the same way one would design products, could potentially lead to customer-hostile rather than user-friendly results.

The essential role of customers has been also recognized in the service-dominant logic literature, as customers are always seen as co-creators of value (Vargo & Lusch, 2004). The customer-oriented process factors such as the specification of customer's role in service process itself and the overall degree of customer participation to the value co-creation and to the service delivery are increasingly relevant areas to study further. (Tuunanen & Cassab, 2011.) The service providers can co-create value by integrating the customers among other different stakeholders into the digital service development process (Cook, Bowen, Chase, Dasu, Stewart & Tansik, 2002).

Reason et al. (2015) state that the best approach for engaging customers starts always with understanding the customers' experiences and needs at each stage of their journey as customers. The customer engagement can be seen as a process that aims to increase individuals' brand loyalty through a sequential psychological process, as well as the mechanisms which help to maintain the repeat purchase customer relationship of a service brand (Bowden, 2009). Customer participation consists of both passive and active ways on how the customers can both interact and influence to brands and their provided services (O'Brien, Main, Kounkel & Stephan, 2019).

Passive customer participation has traditionally been carried out in the form of sending surveys and/or marketing e-mails, gathering feedback and reviews from various channels, and providing other types of interactive mechanisms for customers and the service provider to collaborate. Reason et al. (2015) point out that what customers say and what they do are sometimes contradictory, which is why analyzing customer behavior data, such as complaint logs or activity volumes, plays a role in gathering observations.

Holopainen and Helminen (2011) note that in service innovation, the active participation of customers in the innovation process itself, is an effective way to increase the knowledge on the intended target group, compared to the usage of mere traditional data collection methods.

O'Brien et al. (2019) state that active engagement of customers is forms bilateral relationships, which represents more purposeful and involved ways for customers to interact with service provide. Reason et al. (2015) state that a key aspect in all engagement efforts is the selection of the right channel and the right mode. Active engagement of customers includes co-creating and developing content together with the parties and can be achieved for example through utilization of brand ambassadors, influencers and/or other types of collaborators. Through this type of relationship, service providers can differentiate them-

selves from the competition and maximize mutual benefits for the customers and the brands. (O'Brien et al., 2019.)

By actively engaging the customers throughout the customer journey, service providers can harvest insights and leverage the emerging customer experiences in order to drive service development and accelerate growth (O'Brien et al., 2019).

3.5 Service experiences

The service needs to take account the service experience for its' users. Before value of a service can be assessed by the consumer, it must be perceived or experienced (Grönroos & Voima, 2013). By experience, it is commonly characterized as sensations of interaction through all senses on both physical and cognitive levels (Moritz, 2005). Service experience can be defined as a result of value co-creation in the interactions between service consumers and the company providing the services, and therefore as an outcome of the overall customer journey (Patrício et al., 2011).

Service experience consists of components, which all have impact in determining whether a customer continues the service consumption or better, to promote it to other consumers through recommendations. Among scholars, there are different propositions to decompose the concept into components. Tuunanen, Bask and Merisalo-Rantanen (2012) propose that service experience can be defined through four sub-components, which are: customer's *role perception*, *personalization*, *task complexity* and lastly, *value creation*.

Scholars Tuunanen et al. (2012) have condensed definitions for each of the beforementioned constructs from relevant literature. Personalization is achieved through new combinations of service modules, which enable the customization of services to reflect service consumers desired preferences, values and personality within the service (Alizon, Shooter & Simpson., 2009; Bask, Lipponen, Rajahonka & Tinnilä, 2010; Tuunanen, Peffers, Gengler, Hui & Virtanen, 2006; Voss & Hsuan, 2009 all cited in Tuunanen et al., 2012).

Role perception is defined as the perceived utility of modular services and it is dependent of the consumer's role, the characteristics of the specific service and the desired outcomes expected to be achieved through the service (Cook et al., 2002; Michel, Brown & Gallan, 2008; Tuunanen & Cassab, 2011; Xue & Harker, 2002 all cited in Tuunanen et al., 2012).

Task complexity is described as a service process characterized by varying level of task variety, technical skills needed, and the information exchanged between service and its' users (Tuunanen & Cassab, 2011; Wemmerlöv, 1990 both cited in Tuunanen et al., 2012).

Lastly, the final component in service experience is value creation, which is described as a systematic combination of service encounter processes that all together create new, customizable services of increased utility (Grönroos, 2008;

Tuunanen, Gardner & Bastek, 2011; Tuunanen et al., 2010; Vargo & Lusch, 2004 all cited in Tuunanen et al., 2012).

The customer experience is an accumulating process, which works to both ways, depending on the experiences during consumption of the service (Grönroos & Voima, 2013). Horng (2016) notes that according to Schaupp and Belanger (2005) and Bolton and Lemon (1999), customer satisfaction is an essential success factor for all digital commerce, and that consumers with higher levels of cumulative satisfaction will have a higher usage of the service in general.

Tuunanen, Bask and Merisalo-Rantanen (2012) emphasize Zolnowski's and Böhmann's (2011) statement that it is common for the service providers face challenges in providing excellent service experiences to their customers in the front-end and at the same time delivering the service efficiently in the back-end.

It is important to understand that when designing services, even if every component and module of the service may have been designed with care, but if they do not work well together, the service experience suffers and so does the perceived value of the service as well. This customer experience is a holistic entity, meaning that all the service encounters must be seamlessly orchestrated to work together (Grenha Teixeira et al., 2017).

If the customer satisfaction and the service experience do not meet customers' expectations, they are more likely to not use the service again (Reason et al., 2015). Hence it is important for companies to strive for providing useful and desirable service experiences to their customers as it helps in both customer retention and also in attracting new customers.

4 RESEARCH METHODOLOGY

In this section is presented the rationale for selecting the methods used in this research. Methodology is explained in detail and the processes for both gathering and analyzing of the literature material and the interviews conducted for collecting subject-matter expert insights on the studied topics.

The sections preceding the empirical part of this study first aimed to open up the key concepts and constructs relevant for this research, and also to provide some initial background material for the synthesis on the selected research questions.

The orientation of this study is mainly interpretivistic, a typical philosophical background in qualitative research. In interpretivist approach, potential meanings usually emerge towards the end of a research process (Research-Methodology.net, 2021). Interpretive researchers assume that access to the reality can be found through social constructions, such as through language or shared meanings (Myers, 1997).

This research employs an exploratory research approach. Saunders, Lewis and Thornhill (2009) list three main approaches for conducting exploratory research:

- Literature review
- Interviewing subject-matter experts regarding the topic in hand
- Facilitating focus group interviews

This research uses a combination of first two of the beforementioned approaches. Through literature review a solid foundation for the studied topics was built which was later on supplemented with the subject-matter expert interviews.

4.1 Data collection and literature review

A detailed methodological approach is essential for any type of literature review. According to Hirsjärvi et al. (2009), literature review aims to methodologically introduce the researcher to the topic at hand and helps to familiarize the key concepts and constructs relevant for the study. The process also supports in setting boundaries for the thematic areas to be discussed in the scope of the paper, and guides in narrowing down the overall research problem.

Literature review may also be useful for pointing out what type of methodologies the researchers should employ in his/her works and may provide useful insights on how the research problem could be approached (Hirsjärvi et al., 2009). Levy and Ellis (2006) state that literature review helps the researcher to demonstrate how his/her work contributes something new to the body of knowledge on the researcher's field of study.

Following re-adapted figure (Figure 4) from the works of Arlene Fink (2005) illustrates the process flow for reviewing the literature material for this study.

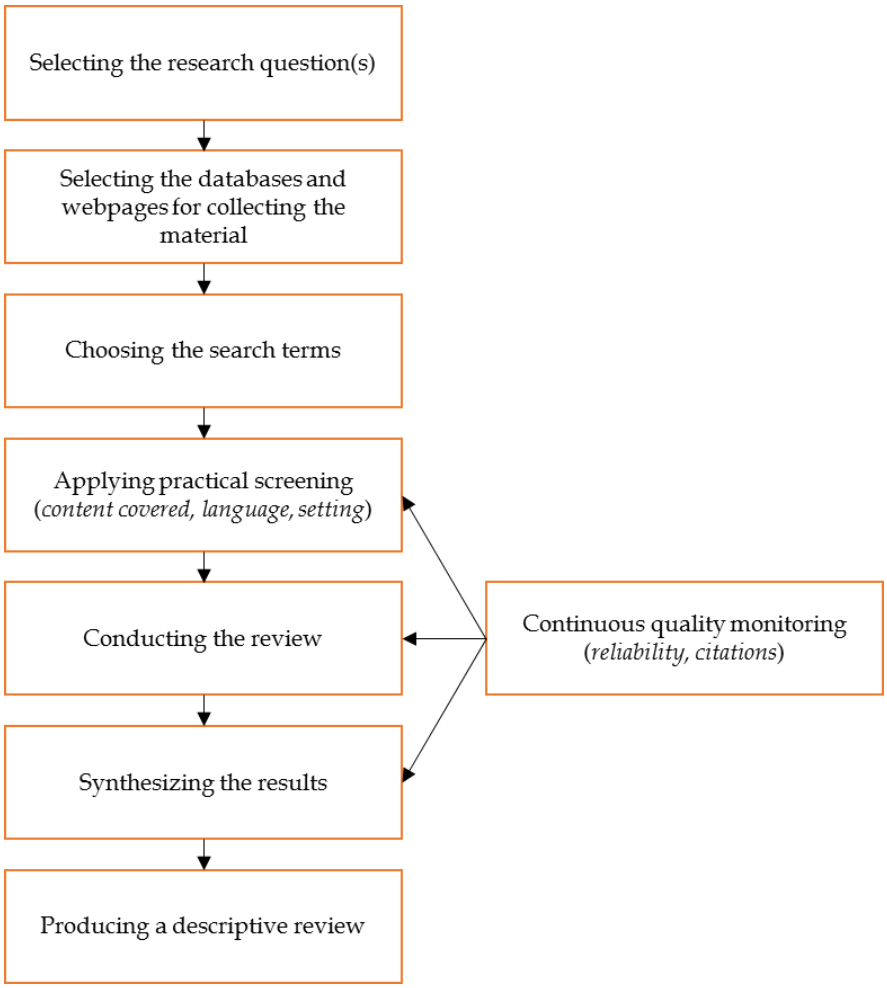

FIGURE 4 Process for conducting literature review, after Fink, A. (2005)

After the selection of research questions for this study, the literature material was to be collected from mainly from Google Scholar scientific database, and also some books from online libraries were used. A total of 134 different literature pieces were collected through extensive literature gathering, though not all of them were utilized in the end. In addition, few online sources were cited to support building definitions for some of the key constructs for this study.

The literature material was gathered by preferring the most respected journals of the field, with favorably a high number of citations. The more recent the found source material was, the more likely it was seen relevant for this study and used in it.

It must be noted that the research process is not always as straightforward as it may have been intended. Also, in this case, throughout the research process the collection of the literature material was iterative by nature, as sometimes the collected materials were not sufficient to provide enough background information on selected topics.

4.2 Qualitative research method

Hirsjärvi et al. (2009) state that qualitative research methods allow new, and oftentimes also unexpected novel information emerge from the research. Qualitative research methods are used to understand phenomena more in detail, and also to find out how and why people act the way they do in certain situations (Sutton & Austin, 2015). Sutton and Austin (2015) also point out that qualitative methods also make it possible to gain insight of the interviewees thinking.

As a foundational basis for all qualitative research is to describe real-life events and phenomena in a holistic way. Events and phenomena are both constantly shaping each other, which creates constantly new interesting relationships that can be studied furtherly. (Hirsjärvi et al., 2009.)

Kaplan and Maxwell (2005) state that in qualitative studies, the researchers assume that they do not possess enough knowledge beforehand to form meaningful hypotheses in advance, therefore the qualitative methods are primarily inductive and potential hypotheses may be developed during the study.

In the domain of Information Systems, it is a known fact that technology continually advances, and new ways of working are introduced time to time. Järvinen (2021) states that there are constantly new technologies to study which can be used to create novel knowledge-based theory. As this study also aimed to gain insight on potential cross-disciplinary similarities, differences and conceptual relationships between classical IS research topic Systems Analysis and Design and more modern field of Digital Service Design, a qualitative approach was selected.

The research approach employed is inductive in its nature, it aims to gain general meanings and themes from interpretations of observations made during the study. The research process starts by delving into the literature material collected for background and follows up to analysis of the empirical data collected

through qualitative subject-matter interviews. All the materials are iteratively studied and synthesized in order to build a coherent end-result, from which the research process eventually aims to provide novel theoretical input to the scientific community. (Hirsjärvi et al., 2009.)

As stated, in this study a case study research was employed. Case study aims to collect detailed and intensive-rich data from singular case or a small group of inter-related cases (Hirsjärvi et al., 2009). Typically, the selected cases can be, for example, individuals, communities or processes, and the data is collected through observation, interviews and/or through literature reviews. In this research, the selected case are subject-matter experts working in roles of the studied topics of Systems Analysis and Design and Digital Service Design.

Benbasat, Goldstein and Mead (1987) point out that a case study research is a viable information systems research strategy from three points of view. Firstly, the case study is a convenient way for the researcher to study either the information systems, their users, or working processes in a natural setting, and to gather a good overview of the current state of affairs within the setting (Benbasat et al., 1987).

Secondly, the method allows the employment of questions revolving on "how" and "why" something is happening the way it is, which helps the researcher to better understand the complexity of the studied topic (Benbasat et al, 1987). As this research aims to find answers on potential conceptual dependencies, differences and similarities in the working processes and methodologies of two closely related fields of study, the selected method seems to suit well this purpose.

Lastly, it is an appropriate choice of method, when studying areas where only few previous studies have been conducted (Benbasat et al., 1987). When delving into the Systems Development and Service Design literature, there were near to none papers that would have considered the scope of this study. Also, when Ostrom, Parasuraman, Bowen, Patrício & Voss (2015) were conducting their research on future service research priorities for rapidly evolving field, they also listed the research area of studying the potential application of systems engineering approaches for developing services as one of the subtopics identified through their study. So, in this sense, this is an area that definitely needs to be furtherly studied also after this study.

As the within the information systems field there are constantly new research areas, technologies and topics to study, a lot of valuable insights can be gained through the effective utilization of case research methodology. As this is overall a somewhat uncharted territory in the domain of information systems research, and there is not a strong theoretical base existing yet, it's a fruitful opportunity to pursue the research through a case study. (Benbasat et al., 1987.)

Case studies therefore provide excellent means for studying contemporary topics, where the boundaries of the phenomenon in hand are not clear. They are more suitable for exploration and hypothesis development, which is why the researcher should employ more of an explorative approach in his/her research (Benbasat et al., 1987).

Hirsjärvi et al. (2009) state that typical qualities for qualitative research method approach in data collection include the use of human experiences as the main ways to collect data, and through it the points of views and respondents' voice can be brought to the audience. As the purpose of the study was to understand the interdisciplinary areas of Systems Analysis and Design and Digital Service Design, and the applicability of the working methods of each to other, the qualitative approach is suitable for collecting insights from domain-specific subject-matter experts.

The case study utilized interviews as means for data collection. The interviews were designed to be semi-structured theme interviews, where the main questions were planned in advance for both domain area experts but as the interview progressed, variable sub-questions were asked, and the general level of discussion was kept informal. Semi-structured interviews combine the advantages of both the structured and unstructured interviews, but at the same time they are less objective comparable than interviews that follow a structured format.

Theme interviews are perhaps the most utilized means for conducting interviews. In theme interviews the essential thematic areas are selected for the topic to be studied (Vilkka, 2005). Great benefits for utilizing interviews as means of gathering data, are that the researcher can be flexible depending on the situation and that he can conform to the respondents answers accordingly (Hirsjärvi et al., 2009).

The open-ended interviewing is an suitable for the reasons where the respondent's views and experiences can be described in his/her own terms, and secondly the interview format is not bound to a rigid format, but potentially unanticipated and valuable information can be probed through additional questions (Kaplan & Maxwell, 2005).

The interviews were planned to last 30 – 45 minutes and during them, the interviewees' views on the selected themes of the research and their applications in their line of work were discussed.

The interviews started with an introductory part where the interviewees were given a briefing of the aims of this study which for the reference were to:

- determine and analyze the conceptual dependencies, differences, and similarities between Systems Analysis & Design methodologies and Digital Service Design methods
- identify potential interdisciplinary applications for work phases of these two closely linked disciplines on a theoretical level and whether they have potential crossovers to the other studied discipline.

The participants were then asked to shortly describe their professional backgrounds and their current role within the organization they were currently working at. Next, we proceeded to the actual interview questions. The interview questions were thematically divided into following topics:

1. General thinking philosophies typically associated with the domains
2. The typical working processes
3. Challenges and issues that they meet in their work
4. Ways to measure successfulness of in their line of work
5. Potential benefits of organizational shift towards service-oriented business models
6. Their views on the similarities, differences and relationship between domains of Systems Development and Digital Service Design

The interviews were recorded, and the dialogue between participants was afterwards transformed to a written form for further analysis. No identifiable information was stored in the transcripts and all interviewees names were converted to aliases with the intention that direct pseudonymized quotations could be extracted from the transcribed interviews. Braun and Clarke (2006) state that the time spent on transcribing the interviews is not wasted as it helps to develop far more understanding to the collected data.

4.3 Target groups and selected subjects for the study

Hirsjärvi et al. (2009) point out that in qualitative research method approach it is oftentimes reasonable to pick the target group purposefully instead of random sampling. They continue, that it is meaningful to pick the interviewees based on their expertise on the studied topic (Hirsjärvi et al., 2009). Therefore, the target group for qualitative analysis comprised of subject-matter experts of systems development, service design and general information technology consulting, working in both small & mid-size companies and large enterprises situated in Finland. No other limitations for interviewees was determined.

The participants to this study were selected from professionals with at least five years of experience within their respective field. Subjects with a longer work history were prioritized when requesting interviews from the group. Also, the recommendations of more senior professionals were considered, when seeking for possible interviewees.

The intended sample size for this study was 10 people, as this amount of interview data is already enough to provide some variability among results for analysis. Guest, Bunce & Johnson (2006) have proposed that within homogenous groups the saturation occurs around 11-12 participants, as after this number of interviews, the answers get saturated and the additional participants most probably will not provide any novel information or fresh insights. However, due to unexpected turns of events on the researcher's state of health during the year 2020, the sample size was reduced to six people, but nevertheless varying results were still captured.

The interviewees consisted, as expected, of a very homogenous group of people with similar demographic backgrounds, and prior studies, which was validated through the background questions asked before going to the main questions.

Following table (Table 2) summarizes the background information for each of the selected participant. The interviewees are hereafter referred as subject-matter experts (SME) 1 – 6.

TABLE 2: Subject-matter experts interviewed for this research

#	Date	Industry	Role	Work experience in the domain
SME 1	5.5.2020	Professional services	Service Designer	5 years
SME 2	7.5.2020	Professional services	Service Designer	5 years
SME 3	7.5.2020	Public sector	Systems Specialist	5 years
SME 4	8.5.2020	Professional services	Service Design Lead	8 years
SME 5	8.5.2020	Professional services	Senior Manager	10 years
SME 6	8.5.2020	Telecommunications	Systems Engineer	6 years

Interviews were conducted during the global COVID-19 outbreak. Global pandemic set restrictions for facilitating interviews physically, which is why all interviews were conducted via Microsoft Teams video conference calls and recorded for further analysis.

Vilkka (2005) states that when using qualitative methods, the research is always bound to time, place and situation, which all are factors that need to be consider on planning. Researcher needs to also note how these beforementioned dimensions may affect to the collected data, and thus to its validity to answer set goals for the research (Vilkka, 2005).

As the interviews were conducted remotely, and the interviewees were informed of their participation to the study well beforehand, they had time to adjust well. The remote conditions made it possible for every participant to find a quiet and peaceful setting for the interview, which resulted in some of them participating from their summer cabins, others from their homes.

4.4 Analysis

The scientific conclusions made through careful analysis and interpretation of the collected data are the main point of any research. Analysis reveals the researcher how well the study answers to the research problems and the objectives set in the beginning. (Hirsjärvi et al., 2009.) This research used qualitative data collected from total of six different respondents.

This research employs content analysis methods, where the transcribed interviews are used to form a condensed description of the studied phenomenon, which also connects the findings to a larger context and the literature material

collected for background (Tuomi & Sarajärvi, 2002). Tuomi and Sarajärvi (2002) continue that in qualitative content analysis the researcher fragments the content into smaller entities, which are conceptualized and furthermore reorganized to new sets of larger thematic entities. Through content analysis the data can be formalized systematically, so that drawing conclusions from the material is more reliable.

It is important to emphasize that this research is explorative by its design. Explorative research fits well to purposes of understanding a phenomenon more clearly, or to gain new insights for the research problem at hand. Explorative studies may also help the researcher to gain experience in unfamiliar topics, which also supports in the formation of hypotheses or whole new studies itself. (Hirsjärvi et al., 2009.)

Through extensive literature review and subject-matter expert interviews, this research aims to gain new insights and views to interdisciplinary similarities, differences and conceptual dependencies between the domains of Systems Analysis and Design and Digital Service Design. As an exploratory study, it in addition, aims to provide priorities for further research on the cross-disciplinary applications of working methods from each domain to another.

Gregor (2006) divides the Information Systems research into five different types: 1) Analysis, 2) Explanation, 3) Prediction, 4) Explanation & Prediction, and 5) Design & Action. The different types of theories are defined on a high level in the table below (Table 3).

TABLE 3: A taxonomy of theory types in Information Systems research (Gregor, 2006)

Theory type	Distinguished attributes
I. Analysis	- Answers to questions: *what is?* - Theory does not extend beyond analysis and description - No causal relationships among phenomena are specified - No predictions are made
II. Explanation	- Answers to questions: *what is, how, why, when, where?* - Theory provides explanations but does not aim to predict with any precision. - No testable propositions are introduced
III. Prediction	- Answers to questions: *what is* and *what will be?* - Provides predictions and has testable propositions - Does not have well-developed justificatory causal explanations
IV. Explanation and prediction	- Answers to questions: *what is, how, why, when, where, what will be?* - Provides predictions and has both testable propositions and causal explanations
V. Design and action	- Says how to do something - Theory gives explicit prescriptions (*e.g., methods, techniques, principles*) for constructing artifacts

The essential one from Gregor's (2006) taxonomy for this research will consist of mainly analysis (1) and explanation (2) of the existing knowledge and the interview answers. The study analyzes and describes the similarities and differences found and sets basis for further studying of this important topic. A detailed analysis itself may also facilitate a possibility to develop ideas or totally new means for systems development and service design professionals' future use.

A fundamental goal for qualitative data analysis is an overall understanding the studied topic. The data analysis is an iterative process, where after the initial understanding has been established, the analysis is constantly refined based on researcher's interpretations, which in turn, causes the end results of this study to be subjective by nature.

Reliability and validity are typically used to measure the overall value of the research and the appropriateness of conclusions. Kaplan and Maxwell (2005) argue that due to the subjectivity and flexibility in qualitative methods, the reliability of the study is generally weaker than in quantitative methods, but the validity is oftentimes stronger. Kaplan and Maxwell (2005) continue that as the qualitative researcher is in close contact with the researched subjects and his/her attention is in the meanings and context, the researcher is less likely overlook or exclude important information or ask wrong questions from the interviewees. They conclude by stating that in qualitative research the loss of reliability is counter-balanced by the greater validity (Kaplan & Maxwell, 2005).

5 FINDINGS

This section opens the findings of the subject-matter expert interviews in a compiled manner. Before starting with the actual questions, the participants were given a short brief to the studied topic and the goals of the research. After this the participants were asked to give a short introduction on their background, current role in the industry and relevant work experience.

Firstly, the interviewees were asked to give a short overview of topic-related thinking philosophies of systems thinking and design thinking, both of which were introduced earlier in this research paper, and whether they have an integral role in the way how they conduct their daily work. Secondly, based on the domain expertise of the interviewee, they were asked a set of questions related to their working methodologies, and how the work is typically initiated on a typical work project.

Interviewees were then asked to describe possible challenges and issues during their working process and whether they have any means to evaluate and/or measure the overall success of the efforts made during planning, analysis and design of development endeavors.

From a more higher-level perspective, the interviewees were asked on their opinions on what benefits they see in a contemporary global shift towards more service-oriented business models. Finally, the participants were asked on their views, how they see their line of work compared to the other studied discipline, and what are the most significant similarities or differences in their opinion.

An essential part of presenting findings is to include an analysis of the interview answers. As Hirsjärvi et al. (2009) state, the research findings should never be left for the reader just as they are, but they should also be opened in an explanatory and interpretive manner. By interpretation Hirsjärvi et al. (2009) mean that the researcher needs to but an effort in both discussing the findings and to make own conclusions based on them.

Analyzed findings should support in building a coherent synthesis, which sums up the main points of the findings and helps to provide answers to research problems and specific questions set for the study. Final conclusions are

drawn based on the synthesis, and the researcher must always question himself/herself what the actual value and meaning of the findings to the scientific community are. (Hirsjärvi et al., 2009.)

5.1 Thinking philosophies guiding the work processes

In order to introduce interviewees to the studied topic, Vilkka (2005) states that the interviewees can be asked to describe some of the key words or areas typically associated to the topic at hand, and how they potentially apply them in their own life or work. Therefore, as a foundational basis for the researched topic, the interviewees were asked to give a short description of what comes to their mind when thinking about closely topic-related thinking philosophies of systems thinking and design thinking, both of which were commonly associated with the studied topics during literature review, and which were introduced early on in this paper. As a follow up, the interviewees were asked whether these thinking philosophies are something that they see to be an integral part of their line of work.

As a general point out, the subject-matter experts of service design domain were more aware of the discussed thinking philosophies and were also able to provide more detailed descriptions of how they first of all interpret them, and secondly, how they see their applicability to their line of work.

Systems thinking as a concept was something that all the respondents saw as a way to formalize things as a combination of different sets of elements.

> **SME 1**: "…main idea for systems thinking is that different things are connected, and that a system is a combination of different components and you need to consider several things regarding their compatibility…"

> **SME 5**: "…systems thinking, how I perceive it, revolves around different types of systems, different types of services, and how they function together, and we think of that larger entity holistically, and notion that they as a whole, actually form a larger system…"

Systems development subject-matter experts saw systems thinking as a relevant guiding philosophy, but perhaps more useful in a larger-scale projects, such as in designing an entire enterprise architecture for an organization. Service design SMEs saw potential for systems thinking also for instance in the form of finding functional chains between different phases of service design.

> **SME 3**: "...in my opinion systems thinking is something that brings higher-level of thinking to the work itself, so in a way it is subliminally part of the development work itself…Systems thinking sounds like it is something that would be useful, for example, in designing the enterprise architecture of an organization…"

As for design thinking, SME 4 sums it up as a development philosophy that can be used as means for problem-solving where starting point is at determining who is going to use the end-solution. He continues that it is a problem-solving methodology that can be applied to both digital, and non-digital service design.

> **SME 1**: "…we are talking about the approach to our clients, so we are emphasizing design thinking, or "service design thinking", that is, putting the consumer in the middle of the process, and then thinking solutions also from the business perspective…"

> **SME 4: "**…under Design Thinking, there are two distinctive ways of working. Another one is so called, pure Design Thinking, where there are no presumptions whatsoever. Then, there is also more of a Lean Startup way, where you first make a hypothesis and leave room for upcoming, unexpected pivotal changes. On the other hand, it may not be as cost-efficient approach…"

In general, the systems development professionals associated design thinking as something that revolves more around system's user interface (UI) and user experience (UX) design and development activities, not that much of their own line of work. They could easily come up with possible explanations on what design thinking actually is without prior knowledge of the topic at hand.

> **SME 6:** "…(*on design thinking*) what comes to my mind, is that, if we for example, start working with a new software, we keep the best practices in mind straight from the beginning and that the software architecture is kept clean and neat…"

SME 4 states that in service design, no methodology or way of thinking can be solely trusted to solve a problem. Context needs to always be considered and not to put too much faith on generic frameworks. Also SME 2 stated some critical views were presented on relying too much on over-simplifying the design process into a form of distinctive methodology, such as the widely used Double Diamond framework (Figure 1).

> **SME 2**: "…Design thinking is an umbrella term for what is done in the domain of service design. I feel that for example in the USA, design thinking has been productized a bit too much. It brings the central elements of service design to mind when thinking about it. Sometimes it feels that it may a bit too easily reduce all the elements of service design to, for example, a Double Diamond frame, so it may oversimplify the whole development process…"

SME 5 agrees and follows up by pointing out that service design should not be solely hypothesis- or framework-driven, but it should always aim to find to understand the initial design problem and then to find the best solutions to any given problem by working iteratively together with the target group of intended users. SME 5 also notes that it could be interesting to compare two otherwise similar projects, where another employs the design thinking ways and the other one would not.

5.2 Working processes

Service design professionals describe that typically the whole working process starts always with understanding both the needs of the client, and the intended end-customer. This is backed up by the literature review, opened more thoroughly in previous sections, where the discovery and understanding the customer needs are seen as the first phase for all design initiatives.

SME 4 states that the initial understanding helps in setting boundaries for the actual design problem at hand, and that continuous communication with the client is at the utmost importance. Phase for understanding the client needs was estimated to last typically 2-4 weeks depending on the project scope and presuming that all the stakeholder interviews are finished in time with no delays.

According to SME 2 one of the most important things in planning any service design project is to clarify what the initiative is aiming for. Sometimes when the overall expectations have not been clarified explicitly beforehand, it can be seen later in the process in the form of unclear tasks. SME 2 continues that it is a constant balancing between what needs to be formally agreed beforehand, and what new potential customer requirements need to be evaluated during the process.

> **SME 4:** "…it is a fine line, if we set too strict requirements at the beginning of a service design project, it may limit the potential solutions in the later phase. Then again, if there are no clearly set boundaries, things become very difficult, as the problem to be solved is too vague…"

> **SME 2**: "…one has to all the time know what we are going towards, but yet still leave room for thinking, if other options are to be evaluated…"

Service design professionals noted that the typical starting point for an endeavor is to formalize the essential *design drivers* and a formal *design problem* that needs to be solved. A design problem is an unmet user need, that the designers are trying to solve. An example of a design problem could be for instance, to ensure cost-efficient service delivery, which availability is ensured also during different peak seasons in demand and when the service provider's employees are on their holidays.

Whenever possible, the design drivers are transformed into measurable metrics, which make the evaluation of design's successfulness more feasible. SME 2 points out that the design drivers bring structure to the work itself and are the main reason for the final outcome to look at it is.

> **SME 4**: "…customer insight provides the essential design drivers, what value is expected from the designed service by its intended customers…"

In the very early phases, the intended users of a concept or a service are identified. Service designers form user personas to understand the target group's

needs better, and to identify potential pitfalls in the delivery of a service. Additionally, the technological limitations for implementation, and desired financial impacts of the outcome are crucial aspects to consider.

Even if service design professionals admit that there are a lot of industry-wide used methodologies that are used commonly, there are still no one-size fits all solutions available.

> **SME 2**: "…Multidisciplinary approach can be seen in many senses and subject-matter experts from various domains all bring their own frameworks and tools to the table…"

One of these more common frameworks is Design Council's Double Diamond (introduced in section 1, Figure 1), which many of the interviewees have used while working for different employers. The service design professionals describe that their working methods include use of workshops that focus on determining future or target state for the service.

According to SME 5, the variety of tools and methods is wide, and means for forming customer insights are always selected case-by-case. More commonly used tools include Affinity Diagrams made with post-its, which for example SME 2 sees one of the most crucial phases in terms of clarifying the expectations. Also brainstorming tasks, which are common in service design related literature, are utilized to some extent.

> **SME 4**: "A well captured customer insight provides us with a business opportunity rather than mere observation on how customers experience the existing services difficult to use."

Sometimes a qualitative research is conducted on the end-users in the premise where they are expected to use the service. For example when using service design for developing client's working environment, it is appropriate to go to the client's office to do the work, instead of creating plans remotely. If the service design team does not set themselves in to the right context, the end-result may not consider things that matter the most to the end-user. The service designers list various examples where they have set themselves into the user context, such as sitting in the cabin of a truck on its route while designing insurance services for the drivers.

In many cases it is common to evaluate whether materials or practices from previous projects can be used to fasten the design process, which sometimes can create a dilemma with the original intention of a customer-driven design. SME 2 states that service design is at worst, best practices-driven, where the use of similar project methodologies may end up resulting in similar outcomes.

In any project it is good to have some unfinished pieces of the intended end-result. There has been a growing interest for value propositions, service blueprint -charts and tangible, clickable prototype models of the design. At the end of a service design process, the team provides the client all the most in-

sightful findings to consider which are furtherly validated with the customer. The purpose of validating is to evaluate whether the outputs of the service design team meet the actual needs and wants of the customer. In addition, it is important to validate the results from an end-user perspective as well, how the intended design would impact the actual exchange of services between service-providers and their customers compared to past, especially when the end-customer is expected to change their past behavior in that specific touchpoint.

> **SME 1**: "Observation and evaluation of test users is an important part of validating the usability of a service."

> **SME 5**: "…to summarize the process, we typically start with a Discovery-phase in the beginning, where we study the target group and gather customer insight. Next, we form synthesis based on all relevant insights at hand, and from there we follow up with a Concept-phase, which provides us with a testable prototype of the service at hand. When we are ready with the prototype testing, we proceed to build a Most Viable Product, or a beta-version of the service for the client. …"

SME 5 notes that there are three important factors to consider in all service design projects: **desirability**, **feasibility** and **viability**. Desirability focuses on the question, whether there is an actual need for this type of service and whether it would provide value for the intended target group. Feasibility considers whether the team at hand is capable of creating such a service, whether client is ready and willing of integrating such a service to their existing operations. Viability considers the financial aspects, and what type of revenue model would be profitable for the service owner.

Increasingly, also for systems development endeavors, the need for development may originate from client-customer needs. In general, most of the initiatives stem from a vision that something could be done better and solutions for this are then ideated. Another point of view that the systems development professionals highlight, is that when a functioning system has been delivered to one client, the successful project could be replicated to other customers as well.

Third typical case is to improve existing systems and how to modernize or develop new functionalities on top of them. The need for modernization and improvements are typically business-driven as new use cases rise gradually and the system users need ways to tackle these in their work.

> **SME 3**: "In terms of modernizing existing systems, the work starts from analyzing the system's functionalities, workflows and background processes, and then walking through these areas with the current system users, whether all are still relevant and what are the current needs."

The duration of initiation, analysis and design phases of the system development are always highly dependent on the complexity and the scope of the system to be created. SME 6 states that much alike in their organization, also in other larger enterprises there is typically a separate teams for defining the wanted specifications for a system, which starts the planning, analysis and de-

sign of the system before the developer team starts their work. System developers participate to system design by giving their feedback on the latter parts of the development endeavor.

SME 3 notes that in many cases much of the overall system design is steered by a designated system architect who shall make the key decisions regarding the system to be built, that is, if there is one that has been nominated for the role.

According to SME 6, domain-specific standards are a significant contributing factor to the system design, as they provide the development team with a set baseline requirements for all projects. After these have been addressed properly, the system requirements may be expanded to differentiating factors based on more detailed requirements analysis.

> **SME 6**: "Many of our system requirements are originally from international standards, which are globally developed in collaboration with different companies and research facilities. Much of the work conducted by our specification team is based on these readily available standards that they apply to our systems."

In business-specific system development endeavors, the system requirements are gathered and co-validated with system users that are accountable for working processes which the system aims to support. The system developers are interested on understanding the most important functionalities for the system and what is required of them. These requirements are addressed with priority over others.

The requirements engineering needs to consider the intended end-users in various phases of the development life cycle in order to avoid a delivered system that meets only the utilitarian value expected by business leaders of the company acquiring the system.

> **SME 6**: "Among the professionals, you hear stories on, for example, healthcare system providers, where the overall design specifications have been made mostly by higher-level executives of the buying organization, only to end up with a system that ultimately does not serve the actual end-users that well.."

The validation of the designed specifications is in the hands of a designated team of testers, who test the system after being built, and provide feedback on how well the set requirements are met, as well as on the overall functionality of the developed system. In case where the testing team finds some room for improvement, they take their findings back to the design and implementation teams, who then make decisions on whether to change some of the requirements, or the way they were implemented.

5.3 Interdisciplinary perspectives on overlaps between domains

This sub-section focuses on investigating and theorizing interviewees views on potential crossover between the two studied disciplines and aims to make it easier to see the relationships between them. The interviewees were approached the topic from to different perspectives depending on which domain they were working at.

> **SME 1:** "We are lacking theory of clear understanding between different disciplines"

The subject-matter experts of service design were asked their opinions on, the similarities and differences between the customer-driven service design work and the requirements analysis and design work of systems development endeavors.

The systems development subject-matter experts were introduced to the topic by describing that service design is driven by the maximization of customer value, and then asked how it compares to the user-centric approaches of systems development endeavors.

First of all, many of the interviewees agreed that working methodologies do have similarities, and much alike in service design, also in systems development it is important to understand who is actually going to use the system, and what kind of ways of working are utilized in the intended system setting. Thus, getting the needed user and/or customer requirements is something that both have in common.

> **SME 1**: "…also in systems development you need to understand who is actually using the system, and their ways of working...you need to interview the users who are using the system, different user groups and their needs and expectations, and their ways of working to get the system requirements..."

> **SME 1**: "...in systems development there is a need to interview enterprise architects and data engineers and integration architects, to capture the current state of the IT landscape…"

Systems development professionals see that compared to service design work, their line of work the endeavors more often start with the business needs of the intended environment where the system is to be implemented, not for example from the purpose of wanting to improve or enhance end-user experience. Nevertheless, they also saw similarities in both of the studied methodologies.

> **SME 6**: "Oftentimes the development effort should be based on user needs…the system developing companies tend to add system features that are mainly business-wise profitable, but which usually also make the system more valuable and beneficial to the end-users."

SME 2 notes that differences between service design and for example system development endeavors that utilize agile methodologies are somewhat ambiguous. Even if they are closely resembling each other, there are still differences. SME 4 sees that in systems development, the work is divided into much more smaller tasks, and the specifications are elaborately defined for each step, whereas in service design the broader playing field leaves room for innovation and conceptualization.

> **SME 2**: "The iterative system development models does follow design thinking principles in a way…maybe service design could also loan ways of working from the agile development. Sometimes also service design projects may end up looking more like traditional waterfall development model."

SME 1 argues that agile methodologies have become kind of a basis for all modern organizational development processes, and not only systems development endeavors anymore. Many large organizations are currently introducing agile ways of working into their setting, and work is built around more manageable increments and sprints. Yet many organizations are not well-suited for applying agile principles straightforwardly, which requires formation of hybrid approaches between plan-driven development and agile practices.

Continuing the thought on agile methodologies connection to service design, SME 5 sees that service design fundamentally revolves around first finding the problem to be solved, whereas agile principles focus more on rapid development of a prototype based on firstly drafted ideas and sketches, and the project is then proceeded to be iteratively developed based on comments received from relevant stakeholder groups. Another side that SME 5 points out, is that as agile practices focus on rapid development of outputs, the end-users and other stakeholders may not be engaged in a manner they maybe should be.

SME 4 sees that customer insight and requirements identified during a service design effort may end up into system development team's backlog of work to be done. The development team may then utilize these and build systems that are more valued by the intended customer-base.

Service design SME 4 sees that if the design and the technical implementation are conducted in separate siloed teams, there is an actual risk that the outcome of the project may not end up looking the way it was intended. Therefore, no matter what type of a project, a larger system development endeavor or a service design project, there should always be someone from the implementation team to provide insights to the design team, as well as someone from the concept team to follow the progress of the implementation.

This idea is also backed up by the supporting literature, as for example Hofemann et al. (2014) state that whereas similarities do exist between service design principles and other user-centered design methodologies, such as UX design, the service design discipline widens the scope to multi-channel and longer-term usage. They continue that consequently, there is a gap in moving to the actual technical implementation, which could be at least partially overcome

by including the developers already to phases when the service concepts are designed (Hofemann et al., 2014).

Loughman et al. (2000) note that systems analysis methods do not consider the cultural implications prior to or after making changes to assess whether system implementation was beneficial of detrimental to the intended environment. They continue that a sociotechnical analysis could help the analysts and designers to optimize the fit of an information system to not only to organization's tasks but to its people and culture as well (Loughman et al., 2000).

System development professionals agree that it would naturally be greatly beneficial to gather end-user input continuously throughout a development endeavor, but in reality, it is very cumbersome to accomplish (SME 6). System developer SMEs see that there is always room for improvement on the topic how to more efficiently take end-users into account.

SME 3 tells that ways how end-users are participated include targeted communications and regular meetings with stakeholder groups that the system is being developed for. This way the development teams get at least some notion on the direction the endeavor is heading towards.

The multidiscipilinarity of the development team as an important factor to be considered in both service design and system development endeavors. It does not provide an optimal end-result if the service design or a system design team works solely by themselves. The teams can also greatly benefit from inclusion of designated facilitator roles, who understand both the context and who fluently communicate between subject-matter experts of various areas. Through active engagement of technology and supply chain subject-matter specialists, the end-result of any service design or other type of development project is more likely feasible, compared to projects conducted solely by service or system designers themselves.

5.4 Measuring success

When discussing with service design professionals on their views how successfulness of a project could be measured, SME 5 sees that it is always easier to compare old, existing services to the ones being built. Even though the benefits of application of design practicalities are noticeable, the objective measurement of these benefits is not a straightforward task.

> **SME 5**: "There have been research efforts on trying to measure design benefits, and it has been said that every dollar invested in design, profits anything from two to a hundred dollars. So, all in all, there are great benefits to be achieved through application of design."

SME 2 concurs that it is rather difficult to measure success for service design as there are no simple one-size fits all indicators, as projects can be very different from each other. Service design projects rarely have success indicators that can

be replicated to other instances and should therefore be tailored to fit each purpose.

> **SME 5**: "If we, for example, have an e-store, which sends e-mails to the customer after made orders, that survey whether everything went as expected, then we should build our performance indicators based on the success."

SME 2 notes that in order to gather a clear overview of the overall success, a lot of different areas need to be evaluated. Service design team may try to objectify some performance indicators for each project, but all interviewees seemed to point out that there is no "silver bullet" for measuring how beneficial their effort has been.

SME 2 feels skeptic on attempts to measure the fulfillment of service providers' value propositions, and he lists this as an aspect not too well-suited to be included as performance indicator. He then proceeded to point out that testable prototypes that can select singular customer touchpoints, can be measured more easily, for example in the terms of, how long does it take for the user to complete a task (SME 2).

According to SME 4 key elements of measurement include the use of data in different forms and how it can be used in modelling for example the economical effectiveness in growing business figures, customer retention or the overall churn rate of customers. SME 4 continues to tell that other performance indicators used by their team include for instance the average length of a service customership, the amount of complaints made within set time window, Net Promoter Score (NPS), which is internationally the most used performance indicator for measuring customer loyalty, that surveys whether the respondents would recommend the product/service to their friends and other acquaintances.

SME 4 notes that problem with the use of NPS is that team should always focus its measurement on a single customer interaction within the process in order it to have actual value. SME 5 continues that while NPS is a classical way of measuring, but in his opinion, it is extremely bad to measuring anything by itself and should always be complemented with other indicators to support it.

SME 4 also points out that if the performance indicators focus solely on measuring the enhanced service experience from the customers point of view, they do not take in to account the effect on internal processes of the organization, as for example, how much the service design's effects can be seen in employee productivity or other means of measuring efficiency and productivity.

System developer SME 6 ponders the question on measuring success from the perspective of how profitable the system ends up being. Systems development is costly effort and its successfulness can typically be measured in monetary means, as for instance how well the project stayed in its' budget. Also, from sales point of view, in the systems development industry, many competing organizations provide solutions based on standardized requirements, and many times the organizations which buy these products will choose the ones that provide the most value and at lowest possible cost.

> **SME 6**: "…one way to measure success would be to think whether the customer finds the new system useful, or not, and another view is to think whether they are willing to pay from the use of it…"

SME 3 summarizes that perhaps a lot of the success in any systems development endeavor stems from the well-conducted requirements analysis and initial system design phases in the development process. He also adds that if the set requirements handle also other aspects than just the system's functionalities, it may not be that straight-forward. This would implicate that similarly as in evaluating benefits of service design efforts and design in general, the more intangible and hedonic value that the fulfillment of systems' non-functional requirements provide to the user, is harder to measure.

SME 6 states that continuous system testing is one essential way to track how successful the development has been in its earlier phases. Testing is conducted in many levels throughout the project. Eventually the overall success of the development effort is determined both in the final steps of the system testing and after implementation. Essential ways to measure success of the system after implementation include, for example, the average amount of users, number of system implementations, the amount of user data gathered from system use within set time frames and the level of maintenance activities required.

5.5 Challenges

When talking about the most typical challenges and issues that the professionals face during their work processes, one of the key issues that service design subject-matter experts mention is that sometimes the client does not have a clear picture of what are the actual needs and wants they wish to achieve. According to SME 4, for instance customer surveys sent to service consumers may give some initial foothold on issues at hand, but they do not clearly give insight on potential design problems.

> **SME 5**: "…in my opinion the challenge that we usually face is that the client requesting our services, does not know themselves where they are heading, and what it would require to fix…"

In some cases, the service design methodology has not been seen as the best way to solve client problems, even if it has been requested of the team. Service design professionals state that it is not possible to always make as many iterations as the allocated client budget forces them to proceed faster than it would require (SME 2). SME 4 agrees and adds that budget issues may limit the amount of data collection in client interviews, and if the target individuals selected for the interviews do not provide the team the expected insights, the design process may end up heading towards wrong direction.

> **SME 4**: "Challenges may arise from small sample-sizes due to tight client budget, which may not be enough to provide us with a valuable customer insight"

> **SME 2**: "There have been cases, where service design was perhaps not the best way to start solving a client problem, but maybe through a more traditional consulting approach…For example, it may be not reasonable to put resources and effort to developing user personas, if the client is not going to utilize them later on. As a recent example, we made a set of user personas for a client, but they never utilized them and inquired what was the reason we even did them for them."

Also, according to SME 5, sometimes service design is seen as a way to try patch problems caught during larger programs, and when the service design team is included too late into the process, it may not be the option for solving the cumulated problems. He continues that projects that are based on design thinking, can't be expected to be superimposed on client problems and fix all previously made mistakes instantly. It requires time that things are done correctly right from the beginning, to get the best end-results from service design.

SME 5 points out also that the project-based approach to service design brings its own challenges to the table as there is always a starting point and an ending point, but longer-term partnership for the whole life cycle of the implemented service lacks. SME 2 concurs by stating that service design work is constant balancing, which requires the team to do compromises during the work, as project time-frame is too narrow and customer representatives availability is not ensured always.

> **SME 2**: "I'd say one the problems is that, as we are conducting hourly-based charged projects to our clients, the time that we have may not always be sufficient for gathering enough customer insights and to question the profound needs and wants. It is a constant balancing."

Successfully conducted service design projects require active participation from the client representatives, as well as from the targeted end-users. Sometimes the tight budget set by the client may lead in narrowing down the research activities, which may consequently lead to insufficient capture of the needed customer insight that would be required for further setting of design drivers and for defining the formal design problem.

Systems Development professionals see that in their domain problems arise usually from wrongly understood requirements, and if the implementation has been designed inadequate for all the use cases intended (SME 3).

Sometimes the number of requirements that have been identified in the earlier phases, may end up becoming overwhelmingly vast. Along the way compromises are made and it may be that only a portion of them get actually implemented (SME 6).

SME 3 sees that as the specifications may be a bit too generic and high-level in the beginning, details need to be considered later on and this requires more work as teams may have done things on their own ways without a common way to match.

Another integration related challenge pointed out by SME 6 is that typically the most challenging part of the development is the system's integration to other systems, and maybe an area what requires more work later on as different teams are not ready take responsibility for matching the requirements between different systems.

> **SME 6**: "When the early phases of the systems development endeavor have based on generic requirements, it may require re-specification later on during the development cycle"

According to SME 3, there have also been challenges when trying to implement a new system based on an old one, and it has not been seen important to put enough effort in ensuring that the old requirements meet the standards of today. In such cases, where the requirements have then been taken as generic ones, it may require extra work in the later parts of the development, as many specifications are introduced in the later stages (SME 3).

6 DISCUSSION

In traditional information systems research it has been noted that there is always a concern that a developed system may not accurately reflect the needs of the intended business environment (Davis & Yen, 1998). Even if a lot of effort has been put into identifying end-users requirements for system use, it is an interesting thought, whether the methods of service design could be utilized for capturing insight on both utilitarian and hedonistic needs and wants of the intended system users.

As the main objectives for the service design process include both enhancing the customer experience the service consumer perceives and at the same time meeting the business objectives set by the service providers, it is also interesting to ponder, could the use of service design in system development endeavors be used for achieving competitive advantage over competitors of the market?

Hofemann et al. (2014) stated that as service design has not been used extensively for the process of designing digital services, and no widely used standard methodology exists, when implementing systems and software, it needs to be combined with relevant development methodologies to actually implement service concepts to a developed system or a software.

Overall consensus among the service design and system development subject-matter experts is that similarities exist between the two domains, but they also still differ in many perspectives. The interviews with industry SMEs and observations made by the author resulted in insights about the value of interdisciplinary collaboration between system development teams and service designers. The interviewees all agreed that due to the interlinking nature of the two studied domains, there could be room for co-utilization of methodologies and collaboration between teams that deploy them in development efforts.

Many of the service design projects focus more on improving existing systems, which will influence to the perceived value that customers get from using a certain service. Quite contrary, system development professionals saw that their development endeavors typically initiate from a business need, not likely from desire to improve or enhance end-user experience. Nevertheless, the sys-

tem development initiatives also typically stem from a vision that something could be done better, and increasingly the business needs for pursuing the development originate also from client-customers.

Alter (2010) argues that making of service concepts more visible in the work of system analysts and designers is both possible and potentially beneficial. In many senses, the system development discipline could also benefit from viewing the system products as services towards their end-users, and also the interviewed subject-matter experts of the system development domain agreed that there is always room for improving the ways how to take end-users into account more efficiently. They also agreed that the methods utilized in service design could perhaps help in achieving better understanding of the customer or the system's intended end-user.

Service design aims on designing a tailored solution based highly on the gathered customer insight, formulated design drivers and a defined design problem. Since the customers participate in co-creating the value for any service by consuming them, it is utmost important that the customers' needs, and requirements are fully understood before providing services to them. According to Gloppen (2011) service designers need to understand two separate types of customer perspective, as they need to be customer-centric towards both the end-users and towards the service providing client. Successfully implemented service will seem relevant for its customers and at the same time is convenient to use, both of which apply to system products alike.

In system development, the non-functional requirements of a system consider more on the matters that are complimentary considered to increase the user acceptance among intended users. The well-conducted requirements analysis in regards of the non-functional requirements shall therefore typically contribute to higher-quality systems from a system's end-user's point of view. The service design professionals saw that especially these types of requirements are something that may be formulated as a side-product from their work after they have finished their projects, and which may later on end up in the backlog of their client organization's technical implementation team.

In case, where the requirements are brought up to the implementation team after the system has already reached later phases of its life cycle, it may not be always possible to add these attributes to the system at that point. In addition, problems related to wrongly understood requirements, time-to-time overwhelmingly vast number of generic requirements and issues related to integration to other systems were seen as most typical challenges in the system development domain. Moreover, as system developers rarely themselves participate to the requirements engineering or the system design, as there are typically designated teams of professionals for this work, findings highlight the importance of how they would greatly benefit from a more close collaboration between the individuals working in system analysis and design roles.

The findings strongly support the importance of conducting design efforts in collaboration with the technical implementation team. Multidiscipilinarity was seen as an important contributing factor in creating optimal end-results for

projects. Also, Ryan (2014) notes that the utilization of systemic design principles allows teams with diverse background to develop an elevated point-of-view of the challenge at hand, and furtherly translate novel insights rapidly into implemented features.

One the topmost challenges that interviewed service design professionals noted was that, time-to-time the client customer does not know what they actually want or need. The client may have come up with an idea that they need service design to solve their existing issues but does not for instance know what the role of the customer is in the process. As an example, from the interview findings, it would not provide much value to the client purchasing service design, if they are provided with a set of designed user personas, which are not actively utilized in further development of the service being implemented.

There have been cases where the client organizations have seen service design as a way to try patch issues caught during larger development programs, which according to the service design professionals should not be seen as a simple solution for solving all the cumulated problems. The findings also indicated that oftentimes, the service design work is conducted project-based for a client organization with a set budget. Many of the interviewees pointed out that due to this fact, it is not always possible to go through the required amount of iterations or they may be forced to limit the data collection, which both may lead to team not gathering sufficient insight for formulating right design drivers or design problems. In order to get the best end-results from service design, it requires time and effort that things are done properly right from the beginning.

The use of service design needs to always be carefully thought whether it is the right choice for the project. Stickdorn et al. (2018) state that as service design is co-creative and hands-on by its nature, it constantly looks for a balance between human needs and business relevance. Therefore, from the business relevancy perspective, sometimes for example a traditional consulting project could lead to better results instead of superimposing service design to endeavors where it does not fit into.

Service design SMEs also noted that design should never lean solely on the use of formalized methodologies in order to avoid framework-driven design. Sevaldson (2017) supports this by arguing that for instance in strategic management settings the use of oversimplified design methodologies may have contributed to degradation of design, and that similar effects have also been noted in other contemporary attempts of trying to make design more scientific than it really is.

The interview results pointed out that trying to measure success of a service design initiative solely by the level how value propositions are fulfilled is a cumbersome effort. Instead, in order to gather a clear overview of the successfulness of a service design project a number of different performance indicators should be formulated. Key elements in all measurement of successfulness in both domains revolve around the use of data in its different forms, and how it can be used for modelling for example customer retention or the financial effectiveness. However, in service design line of work the performance indicators

are seldomly re-usable, as they should always be tailored to fit the relevant context. Neither should the system development teams see the mere objective performance of a system as the determining indicator of its successfulness.

While it would be an over-simplification to state that system development success is measured only in the profitability of the system, it clearly is one of the key determining factors among the industry. This suggest that there is a distinction on how the successfulness of a project is evaluated between the studied domains. This is a of course a mere generalization, as system development endeavors are typically large initiatives, whereas service design projects usually focus on development initiatives of a more granular level. Thus, in this sense, the domains are not straight-forwardly comparable. However, if the methods of service design were to be integrated also within the smaller-scale tasks within the whole system development endeavor, they could be more rationally leveled.

7 CONCLUSION

This concluding section compiles the key contents and main observations of this study by extrapolating what was learned from this research. Section also discusses on what the results conceptually mean, what are implications for research and practice, what are the limitations and recommendations for practice and future research.

The paper was divided into seven separate sections. First section introduced the reader to the topic at hand, set the research objectives and formulated the relevant research questions. Following sections two and three focused on reviewing the domains of systems analysis and design and designing of (digital) services respectively. The source material used for the literature review of this study were collected with the idea that they could support in building a solid foundations for the key constructs of the studied domains.

Fourth section provided the rationale for selected qualitative research methodology, opened up how the supporting literature review was conducted and discussed how the empirical data was collected and furtherly analyzed. Orientation of the study was mainly interpretivistic, which is typical philosophical background for qualitative studies. This research employed an exploratory research approach, where literature review was utilized for building a coherent foundation for the studied domains, which was later on supplemented with domain-specific subject-matter expert case interviews.

Fifth section delved into the findings of the subject-matter expert case interviews and presented the key findings in a compiled manner. Sixth section focused on discussing and analyzing the findings by supporting them with relevant literature material.

As a primary objective, this study aimed to find similarities, differences and other types of linkages between planning, analysis and design phases of systems development endeavors compared to working methods of service design discipline. Literature review provided solid foundations and conceptualizations of the key terms for the domains of Systems Analysis and Design and Digital Service Design.

Systems Analysis and Design was described as an approach for systematically identifying problems, opportunities and intended objectives for a system to be developed, and for analyzing the organizational information flows between systems and their users (Kendall, J. & Kendall, K., 2014). Systems analysis can be seen as having an important role in both setting the functional and non-functional requirements for system under development, and in preventing the failure of a development initiative by providing input on whether the project should proceed or be cancelled before investing any more resources to it.

The significance of design has been recognized by scholars from different fields such as architecture and engineering, but it has come to stay as a crucial part of the digital service development process as well. Service design as a field has evolved from a niche design discipline to an accessible and comprehensive way to tackle customer and organizational design challenges in virtually all areas (Reason et al., 2015). Service design helps organizations to view the services they offer from their customers' perspective. Through closely collaborating and engaging all the customers, intended end-users of a service and the service delivery team, service design helps organizations to create a holistic end-to-end understanding of their services and potential meaningful improvements. (Stickdorn et al., 2018.) By digital service design, this study applied the concept of service design into the domain of purely digitally provided services.

This research paper does not claim to present a complete framework for integrating the two studied domains, but it rather delves into building foundations for further research. In the scope of this research, focus was on six key themes: 1) process output; 2) foundations for the design process; 3) target group; 4) target group's contribution to the process; 5) individual perceptions on usage; and lastly, 6) post-release continuous management.

As a starting point, both the concepts of **system** and **service** were rigorously defined based on extensive literature review. They are determined as the process outputs of system development endeavor and service design project respectively. By foundations for the design process, the research compares concepts of **understanding requirements** for a system and **understanding co-creation of value** in services. Domain-specific target groups to whom the developed system or a designed service are targeted to are respectively defined as the **system user** and the **customer** of a service provider.

Fourthly, the research examined the target groups' contribution to the process by studying the **passive participation of system users** and **active participation of service customers**. Next the individual perceptions on usage were explored through the **use of a system** and through **experiencing the services**. Lastly, the post-release continuous management of systems and services were studied through the concepts of **system maintenance** and **customer engagement**. These activities revolve around prolonging the use of a system after delivered and strengthening the bond between service provider and customer through the means of engagement. Following is presented a summarizing typology (Table 4) where the concepts' definitions are condensed from the literature review.

TABLE 4: Summarizing typology of the studied key concepts' definitions

Key concepts for Systems Analysis and Design	Definition		Key concepts for Digital Service Design
System	A set of interacting elements that work in synergy to perform practical functions.	A function and/or means for delivering value to customers of a providing entity by facilitating outcomes that the customers wish to achieve, but without them having to take ownership of related costs or risks.	**Service**
System User	Person who acts as the end-user of a system, and through it captures, validates, enters, responds to, or exchanges information.	Individuals purchasing products or services from a market actor, in order to fulfill a perceived need.	**Customer**
Understanding requirements	Capturing valid functional and non-functional requirements for a system which have direct, strong impact on the quality and the cost of the finalized software product.	Value of a service is always co-produced with the customers; thus, value co-creation considers how the value is created in collaboration with all the stakeholders of a certain service.	**Understanding co-creation of value**
System Use	Process in which the end-user either operates or chooses not to operate the system. Used as a traditional indicator for measuring the successfulness of a software product.	Result of the value co-creation process reached through the cognitive and physical interactions between service consumers and the service providing entity.	**Service Experience**
Passive participation of users	A set of activities conducted by the users during the system's development phase in order to capture requirements that shall add value to the intended users of a system.	Relationship aiming to maximize mutual benefits for both the service provider and its customers by co-creating and developing service-related content together with the parties involved for example through utilization of brand ambassadors, influencers and/or other types of collaborators.	**Active participation of customers**
System Maintenance	Process of keeping systems operational after its implementation by modifying the system or its components in order to correct faults, improve overall performance, or to adapt to a changed environment.	Process of aiming to increase individuals' brand loyalty and re-purchase relationship through a sequential psychological process, that revolves around understanding and fulfilling the customers' needs at each stage of the service experience.	**Customer engagement**

After understanding the foundational premises of both of the studied domains, as a secondary objective, this paper studied the possibilities for interdisciplinary applications for the work phases of Systems Analysis and Design and Digital Service Design.

Findings of the study strongly suggest that the working methodologies between service design and modern, agile and user-centric software methodologies do share similarities but cannot be seen completely alike. Whereas service design leaves a lot of room for innovation and conceptualization, in agile systems development, the work is more often divided into small tasks, where the specifications for each step are elaborately defined.

One traditional point of view and key stream for conducting information systems research is the prediction of an information systems usage. It is not uncommon for system development projects to fail because the implementation of the system has been pursued without a holistic understanding, which consequently has led to users not receiving the functionalities expected. Common to many failed system development projects is that the stakeholders included in the initial requirement analysis have often been more senior higher-level executives of the system acquiring organization, who may not have the clearest visibility on the grass-root level work that the typical end-users conduct daily. Therefore, there is most definitely potential for utilizing service design methods also in capturing the needs and wants of the actual end-users of a system.

Sometimes the developed systems may be designed unnecessarily heavy for the intended purposes. Reason et al. (2015) point out that by taking a customer-needs driven approach for digital developments, it provides a unique opportunity to reduce the complexity in the developed services or systems. They continue that by taking out activities that encumber the end-user will provide efficiencies they expect from the consumption of digital services of usage of systems (Reason et al., 2015). Taking the argument to its conclusion, a genuinely customer-driven approach in systems development could result to more satisfaction to the system user.

Interviewees agreed that it would be greatly beneficial to gather end-user and relevant stakeholder input throughout a development endeavor, but it could end up being too cumbersome if conducted continuously. Nevertheless, if the system analysis and design work is conducted siloed teams, there is always a risk that the outcome shall not be anything that the actual users would wish for. Similarly, like in a typical service design projects, the system development teams could benefit from inclusion of designated facilitator roles, who fluently communicate between subject-matter experts of various domains, and who themselves are familiar with the context of the development endeavor.

Among the interviewees the multidiscipilinarity of the development teams was seen as highly advantageous for producing more feasible end-results in both service design and systems development endeavors. Stickdorn et al. (2018) support this by stating that by working in a series of iterative, explorative loops, with early user feedback and prototyping, the development teams may spark meaningful conversations, create common understanding on the developed

topic, create implicit knowledge and further stimulate the development of a common language. According to Vargo, Maglio and Akaka (2008), the interdisciplinary exchange of ideas and effort with the purpose of sharing understanding on value co-creation, will not only benefit the service science developing scholars, but it shall also potentially aid the advancement of all other relevant social and economic disciplines involved. This is why the understanding of the concepts of value co-creation are an important part for also the people working within systems development domain to understand. The orthodox view on thinking about systems development methods includes the presumption that the outputs of the endeavor are "goods". Perhaps a shift in the way of thinking that the outputs can be seen as services, could stimulate ideas on how to co-create value together with the system's intended end-users.

A lot of the success in a systems development endeavors stems from well-conducted requirement analysis. Requirements engineering in general can be seen as perhaps the most crucial stage of the system development life cycle, as any errors made during this phase, and discovered only afterwards, will typically cause delays, cost overruns and unrealized requirements from the implemented system.

Service design professionals pointed out that sometimes the customer insight and requirements identified during their project efforts have ended up into the client organizations' system development team's work backlog. This raises a question why it is not conducted as a normal part of the development process? Service design practices could be potentially utilized in the analysis phase of a development endeavor, where the effort would be on identification of end-users needs and desires, which would generate the needed insight for formulating design drivers and a formal design problem for the development team to pursue.

The system development industry could possibly benefit from employing internal service design professionals to support development endeavors, and to tackle issues related to limited budget availability. Also, the mere introduction of tools derived from service design domain could already be beneficial for system development teams to familiarize with.

7.1 Research implications, limitations and recommendations

Vilkka (2005) states that all research should be able to identify the studied topic through rigorous definition. In addition, the research should produce something that has not been previously said, it should be beneficial to at least some defined party, and lastly, it should build solid foundations for a public debate (Vilkka, 2005).

Studying of similarities, differences and applicability between separate domains produced knowledge about the working processes, potential challenges and ways to measure success. Therefore, it can be stated that the results of this study provide value to systems development and service design profes-

sionals alike. The main contributions provided by this study cover potential applications of the service design discipline to the systems development domain.

This study provides the academia and business domain with strengthened theoretical grounding, conceptual foundations and discussion points for future development of co-utilizing methodologies of service design in systems development endavors. Secondly, the research stimulates an academic interest on furtherly studying the linkage between domains of Systems Analysis and Design and Digital Service Design and understanding potential issues involved.

Vilkka (2005) notes that when evaluating the reliability of the study, the independence of the researcher is an important factor to consider. The researcher had no specific affiliation towards either of the studied topics. However, few of the interviewees were colleagues from the same employer, working in a different business unit and with no prior linkage to the researcher. The reasons for selecting the studied topic for this research were also opened in the previous sections. Moreover, this research is also reliable due to the fact that no prior expectations were formed beforehand, that could have ended up guiding the results. During the interviews, the interviewees were let to provide answers in a way that reflects to their own views and experiences on the studied topics. In sense of verifiability, even if there existed near to none research papers on studying the linkage between service design and systems analysis and design, the results had commonalities with earlier literature on applying service design, systems thinking and design thinking on different domains.

From a relevancy perspective, the studied topic is highly relevant for both current and future needs. Leveraging service design and application of systems engineering approaches for developing services are identified as one of key future research priorities for this rapidly evolving field (Ostrom et al., 2015).

Although useful conclusions are derived from the results of the present study, there are few limitations and future recommendations that should be taken into consideration. In the collection of qualitative data, the term of saturation is used for describing limit from which after additional data would most probably not provide the researchers with any fresh insights. Considering that this analysis consisted of interviewing six separate subject-matter experts, it cannot be stated to have reached its intended initial target of 12 different interviewees. Reasons for this were opened more in detail in the section focusing on this paper's research methodology. Nevertheless, already with this amount of conducted interviews results were varying enough, but on a higher level, they were close on reaching the desired saturation level as much of the collected data recurred in all of the interviews. Even though the results were consistent, a larger sample size could have resulted in stronger results.

The collection of interviews was conducted remotely through electronic means, which provided the researcher and the interviewees a lot of flexibility on where the interviews shall be held. The reserved time for each of the interviews was viewed adequate both from the interviewees and the researcher's perspective.

Limitations include also the relatively narrow amount of constructs related to Systems Analysis and Design and Digital Service Design opened in the literature review. The scope of this research was difficult to limit as both the studied areas are extensively studied topics in information systems literature. However, there existed near to none papers focusing solely on describing the interlinking nature of early phases of systems development and the emerging service design practices.

Whilst establishing a typology for comparing the different key elements of Systems Analysis and Design and Digital Service Design, it is important to recognize that the elements do not cover all possible aspects related to the studied topics. However, this paper hopefully provides the scholars around the world with useful starting points for drafting a more holistic framework for integrated view.

One key takeaway for the academia world based on the interview results was that the systems development subject-matter experts were not too aware of the emerging field of (digital) service design. They had some prior knowledge on the topic but could not elaborate on many of the questions presented on them. This raises a question on whether the topic reaches all students of today completing their degree in computer science or other closely resembling areas.

All service providing organizations could benefit from examining their business functions from the customer experience perspective, as in a more holistic notion of service design, it does not only concern with end-user's experiences, but also experiences of various different intermediaries and stakeholders within a service network. As a recommendation for all representatives of business domain, it shall be noted that the use of service design can be applied on several levels to different business processes and to the whole operating model of an organization, which all together have positive impact on building customer experience.

The involvement of service designers in the development of systems implies an extension and co-utilization of the traditional domain-specific methodologies. Service designers could help for instance in building the initial understanding of a design problem, capturing system user insights, conceptualization of solutions and collaborating with the technical implementation team.

7.2 Future research topics

Service design has established its place in incremental and radical service development, in service innovation and in the improvement of services and customer experience (Stickdorn et al., 2018). As the digital service industry keeps continuously evolving, so does the need for service design research. The emerging service science and service innovation literature has largely overlooked possibilities of leveraging applied digital service design in systems development domain. Paying special attention to the emerging service economy sector and applying a service design lens to the question on how systems development life

cycle could be optimized both shall remain an important task both today and tomorrow. Therefore, future research toward this direction is also particularly necessary.

Although it falls outside the scope of this paper, more research on how service design methodologies could be utilized in capturing utilitarian and hedonistic needs and wants of users of a system under development. Also, the overall degree of customer participation to the value co-creation process and to the service delivery are increasingly relevant areas to study further.

Even as this research already shed light to some of the key constructs of the domains of Systems Analysis and Design and Digital Service Design, it merely scratched the surface on all potential areas that these two domains have to offer. This paper hopefully provides some useful elements to help fuel further studies on either building a more detailed framework based on the initial work conducted in the scope of this paper, or on focusing on one of the domain-relevant constructs on a more granular level.

In order to increase the validity of the findings emerged in this research paper, the studied topic could also be approached from different angles through utilization of theory and methodological triangulation. In the scope of theory triangulation, other theoretical schemes could be used in the background for interpretation of the linkages between studied domains.

Through utilization of methodological triangulation, in order to increase the sample size, the data gathering methods used in this study could be complemented or replaced with survey questionnaires to be sent for larger audiences. Similarly, to many service research topics, future studies could also approach the topic from a more practical level by applying service design methodologies as an integral part of the system development life cycle's early phases and conducting a field study focusing on observing the methods in practice. This way the actual benefits from usage of these methods could also be more appropriately captured and documented.

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APPENDIX 1 – THE INTERVIEW QUESTION FORM

Background information:

- Please shortly describe your background and current role within the organization you work at? (Name, age, education, work history etc.)

Theme questions for all SMEs: Thinking philosophies

- Please give a short description of what comes to your mind when you think about the following thinking philosophies.
  - Systems thinking
  - Design thinking
- Do you think either of these ways of thinking to be an integral part of your line of work? How?

Theme questions for SMEs of Systems Analysis and Design:

1. **Describe how previous / current system development endeavors that you have participated in have typically been initiated.**

   Who are the key stakeholders' whose input is most needed during early phases?

2. **Describe how the system requirements analysis is typically conducted and what kind of effect does it have on the system design?**

   How the different types of requirements are validated?

3. **Please give a short walkthrough on how the system designing has typically been carried out in your prior development endeavors.**

   Is system design seen more of a one-time effort or continuous process?

4. **What are the most typical requirements or system design related issues faced during development work?**

   How they are usually tackled?

5. **In what ways the success of the system development is measured and how much of it is dependent of the initial system requirements analysis and design work?**

What are the most essential qualitative and/or quantitative means for analyzing success?

6. **What do you consider to be the most significant benefits that an organization can gain by shifting to a more service-oriented business model?**

7. **Service design is driven by the maximization of customer value. In your opinion, how does it compare to the user-centric approach on development of systems?**

   What are the main similarities and differences in your opinion?

Theme questions for SMEs of Digital Service Design

8. **Describe how does the service design process starts typically?**

   How different customer requirements are considered in the process?

9. **Please give a short walkthrough of the different phases for innovating and design processes in your work?**

   What types of frameworks, methods and tools are used typically? What deliverables are produced during processes and how they are validated?

10. **What are the most typical issues faced during service design process?**

    How are they usually tackled?

11. **How do you measure service design success?**

    What are the most essential qualitative and quantitative means for analyzing performance?

12. **What do you consider to be the most significant benefits that an organization can gain by shifting to a more service-oriented business model?**

13. **In your opinion, how does the customer-driven service design work compare to the requirements analysis work of systems development endeavors?**

    What are the main similarities and differences in your opinion?