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ENHANCING VALUE CREATION AT THE FRONT-END OF A COLLABORATIVE HOSPITAL CONSTRUCTION PROJECT

UNIVERSITY OF OULU GRADUATE SCHOOL;
UNIVERSITY OF OULU,
FACULTY OF TECHNOLOGY

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Abstract

Healthcare projects are characterized by a complex operating environment with high degree of uncertainty due to a large number and variety of stakeholders with their conflicting interests. It is difficult to define project specific objectives and requirements due to the accelerating pace of change in medical and technological development. The development of healthcare often consists of large construction projects and represents large investments and changes in established welfare systems, making the setting of strategic goals of hospital construction projects crucial. All this makes the front-end phase the most significant in hospital construction projects.

The main aim of this research is to contribute to value creation in a collaborative hospital construction project, especially to the front-end of the project. This work applies a qualitative research approach and utilizes a case study methodology. The data for this research has been collected through a survey and semi-structured interviews and workshops. The results indicate in relation to the earlier research that simply providing an appropriate way to implement a collaborative project—by enabling early participation and interaction—with appropriate interoperability tools and methods by repeating “early involvement and integration,” "focus on people," and "value for money" is simply not enough. There is a lack of systematic processes for planning and managing the front-end phase of hospital construction projects. A more systematic and comprehensive process can help clients and project stakeholders define their goals and requirements more precisely so that value expectations and implementation concepts, as well as skills needed to succeed in value creation, can be defined at an early stage. This dissertation is an effort to bridge the research gap by focusing on enhancing value creation by investing in the front-end phase of a hospital construction project.

Keywords: collaboration, early involvement, integration, interoperability tools and methods, the front-end

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Tiivistelmä

Terveydenhuoltoalan sairaalarakennushankkeille on ominaista kompleksinen toimintaympäristö, johon liittyvä epävarmuus johtuu suuresta joukosta erilaisia sidosryhmiä, joiden intressit voivat usein olla ristiriidassa keskenään. Lääke- ja hoitotieteen sekä terveysteknologian kehittyminen yhä kiihtyvällä vauhdilla tekee sairaalahankkeiden tavoitteiden ja vaatimusten asettamisen vaikeaksi. Terveydenhuollon kehittäminen koostuu usein suurista julkisista rakennushankkeista, ja niihin liittyy suuria investointeja ja merkittäviä muutoksia ja vaikutuksia vakiintuneisiin hyvinvointijärjestelmiin. Tämä tekee niistä tärkeitä strategisten tavoitteiden asettamisen kannalta. Tämän vuoksi projektin alkuvaihe (front-end) on tärkein vaihe sairaalarakennushankkeissa.

Työn päätarkoituksena on tuottaa uutta tietoa yhteistoiminnallisten sairaalarakennushankkeiden arvon tuottoon, erityisesti projektin alkuvaiheisiin. Tässä työssä sovelletaan laadullista lähestymistapaa ja tapaustutkimusmetodologiaa. Tämän tutkimuksen aineisto on kerätty kyselyn sekä puolistrukturoitujen haastattelujen ja työpajojen avulla. Tulokset osoittavat aikaisempaan tutkimukseen verrattuna, että tarjotaan sopiva tapa toteuttaa yhteistoiminnallinen projekti – mahdollistamalla varhainen osallistuminen ja vuorovaikutus – sopivilla yhteistoiminnallisuuden työkaluilla ja menetelmillä. Hokemalla "varhaista osallistumista ja integraatiota", "keskity ihmisiin" ja "arvoa rahalle" ei yksinkertaisesti riitä. Sairaalarakennusprojektien alkuvaiheen suunnittelun ja hallinnan järjestelmälliset prosessit puuttuvat. Systemaattisempi ja kattavampi prosessi voisi auttaa projektien omistajia ja hankkeen sidosryhmiä määrittelemään tavoitteensa ja vaatimuksensa tarkemmin niin, että arvo-odotukset ja toteutuskonseptit sekä arvonluonnin onnistumiseen tarvittavat resurssit ja taidot voidaan määritellä jo varhaisessa vaiheessa hankkeita. Siksi tällä väitöskirjalla pyritään kuromaan umpeen tutkimuskuilua keskittymällä arvonluonnin tehostamiseen investoimalla sairaalan rakennusprojektin alkuvaiheeseen.

Asiasanat: aikainen osallistaminen, front-end, integraatio, yhteistyö, yhteistyötä edistävät työkalut ja menetelmät

Acknowledgements

Since the early 1990s I have been involved in many discussions and heard arguments about poor project management, right or wrong choices of projects implementation methods, dissatisfied clients and end-users due to misunderstanding of their goals and needs, dissatisfied top management due to reduced project profits, and worst of all unhappy and demotivated project staff and project participants. It took a long time before I myself started to think about whether these things could be influenced at the very beginning of the projects - e.g. in the front-end stages, or do we have to go through the same holes over and over again in all projects, and who should take these into account?

During this study, I have had the privilege of working in Finland's largest ongoing hospital construction project. I can tell you that all the challenges that have come up in past projects during my career even seem insignificant now. I joined the Integrated Project Delivery -development program in 2014, the goal of which is to develop productivity in the construction industry and to develop project implementation models in a more collaborative direction. During the program, my interest in the management of large and complex construction projects and especially in the development of collaborative implementation models began to deepen. Particularly I have been interested in how the client's needs and goals can be defined as the value produced for the client, and how the value promise is realized. All the stakeholders, project partners, organizations and people I have met and known in my professional life have both expanded and enriched my personal network and inspired my journey in this research. I am very grateful for that.

Although I never expected that one day I would get a doctoral degree I have had a vision that it might come true. The first time I met Professor Harri Haapasalo was about five years ago, and at the time I had plans to continue my studies, but I was still looking for a topic, direction and goal. After various stages, one day Harri and I were in a conference room and we drew our own thoughts on the wall board, which reflected our experiences of the reasons for the failure of projects and how we could improve their chances of success. The story could continue even longer, but this is how my research and journey into the unknown began.

There are many people and organizations to whom I own gratitude for making this journey possible. First of all, I would like to express my humble and deepest gratitude and my warm thanks to Professor Harri Haapasalo, who has guided and coached me on my academic path. He shared my personal vision and believed in me and gave me this chance and opportunity to realize my secret dream. Without

his endless support, his advice, ability to steer me in the right direction, his ability to give direct feedback and really “kick the ass” in the right place, and the common sense of humor we share, we would not be here to share this award and joy. I look forward to taking new steps in the research sector and hopefully one day we will see our research bring improvement to the construction industry.

I am grateful for the valuable and constructive comments and recommendations of the preliminary examiners of this thesis, Dr. Tech. Virpi Turkulainen and Dos. Jukka Pekkanen. The feedback greatly enriched my thesis. Dos. Jukka Pekkanen and Dr. Tech. Matti Sivunen have kindly agreed to act as opponents in the public defense of this dissertation. On this journey, I have received very useful contributions to journal articles from M.Sc. Eng. Farooq Ali, and Dr. Tech. Jere Lehtinen, and important peer support from M.Sc. Eng. Petteri Annunen. I would also like to thank M.Sc. Eng. Henriikka Haapasalo, who helped me in the initial stages of the research in planning, conducting interviews and analyzing the results. I am very grateful to many other people, especially to all my colleagues and co-workers in our work community, but also to all company representatives who have offered their support, comments and contributions to my research work and publications. Thank you all for your contribution and cooperation.

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The last but the most precious, to my lovely wife, Aila - the light of my life - thank you for all the support and love you have given me. You have always believed and trusted in what I am doing, and you have been unselfish and done everything for it that I have been able to focus on my thesis. Fortunately, you have also quickly gotten me back on the ground when the flight altitude has started to be too high or the speed has started to accelerate too much. Thank you my love.

Villa Tamppaari, Vaala, Finland, September 2022 Kari-Pekka Tampio

Abbreviations and definitions

CBA	Choosing by advantages
Client	The focal organization responsible for leading a project
End-user	The medical and maintenance staff of a hospital
IPD	Integrated project delivery
L	Legitimacy
LCI	Lean Construction Institute
LPS	Last Planner™ System
NOHD	Northern Ostrobothnia Hospital District
PA	Project alliance
PMO	Project management office (represent the client)
PPT	Logic as the basis for action development, where the idea is to utilize tools and procedures (T) to get people (P) to follow the process (P)
RFS	Respect for people
RQ	Research question
U	Urgency
TVD	Target value design
Best for the project	Decisions are made based on what is considered best for the project, which results in optimal solutions based on a high degree of common understanding and communication between the project stakeholders.
Big room	The Big Room concept is a workplace organization that uses common technology but has key human relationships, which provides a context in which the design, operation, regulations and responsibilities of physical spaces are highlighted.
Interface stakeholders	Interface stakeholders are those who operate both internally and externally and do not belong to the alliance agreement.
Project stakeholders	Project stakeholders are persons or organizations that affect the project or are affected by the project.
The front-end	In the pre-stage of the project, the client develops the project definition and defines the implementation concept.

List of original publications

This thesis is based on the following publications, which are referred to throughout the text by their Roman numerals:

I Tampio, K.-P., Haapasalo, H., Haapasalo, H., & Ali, F. (2022). Stakeholder landscape in the public healthcare process - challenges, elements and impacts on stakeholder management [Manuscript submitted for publication].

II Tampio, K.-P., Haapasalo, H., & Ali, F. (2022). Stakeholder analysis and landscape in a hospital project - elements and implications for value creation. *International Journal of Managing Projects in Business*, *15*(8), 48–76. https://doi.org/10.1108/IJMPB-07-2021-0179

III Tampio, K.-P., Haapasalo, H., & Lehtinen, J. (2022). Client's pertinent stakeholder activities in the front-end phase of a hospital construction project [Manuscript submitted for publication].

IV Tampio, K.-P., & Haapasalo, H. (in press). Organising methods enabling integration for value creation in complex projects. *Construction Innovation*. https://doi.org/10.1108/CI-11-2021-0223

Two of the articles have been published, and two are under review in international scientific journals. All original studies have undergone or are currently undergoing a double-blind peer-review process. The author of this dissertation was the first writer in all the original publications, meaning that the author had the main responsibility for the research work by planning the research, gathering and analyzing the research data, and writing the research manuscripts. The other authors participated in the research by planning, reviewing, and commenting on the articles, gathering data, and designing the research.

Contents

1 Introduction

1.1 Background and research environment

Hospitals in Europe and their leaders are dealing with a multitude of challenges and changing circumstances. They have to adapt to changing but interlinked factors, including an aging population and morbidity, changing disease patterns, a mobile healthcare workforce, workforce shortages, skyrocketing costs, the introduction of new medical technologies and treatment processes, new medicines through new therapies, mounting consumer, employer, and policy expectations, aggressive union tactics, and new funding mechanisms (Barlow & Köberle-Gaiser, 2009; de Neufville et al., 2008; Olsson & Hansen, 2010).

In addition to the factors mentioned above, future trends in population and disease can be predicted with some certainty. It is much more difficult to predict these other factors because of the accelerating pace of change in recent history, which has been faster than ever before (Black & Gruen, 2005; McKee & Healy, 2002). These factors are increasing the complexity, uncertainty—in terms of the involvement of a large number and variety of stakeholders (Frechette et al., 2020; Sanderson et al., 2018)—and dynamism of healthcare processes (De Waal et al., 2012; Parvinen & Tolkki, 2007).

Uncertainties in hospital environments are due to the global phenomena described above. However, we can also blame the complexity of healthcare processes, which is due in large part to their organizational complexity and dynamism (Fréchette et al., 2020; Glouberman & Mintzberg, 2001) and their status as multifunctional and multidisciplinary collaborations (D'Amour et al., 2005; Lockhard-Wood, 2000; Moran et al., 2007). Healthcare processes include a multiplicity of stakeholders that have their own interests, perspectives, and priorities, which may often be in conflict (Hudelson et al., 2008; Muntlin et al., 2006). Thus, a hospital and related organizations form a fundamentally vague and complex social system (Begun et al., 2003; Wilson & Holt, 2001; Zimmerman, 2010), where changes are challenging to introduce (Aubry et al., 2014).

The development of healthcare often consists of large public projects with multiple stakeholders and organizational, leadership, and management issues; they are usually long-term and represent major investments and changes in established welfare systems, which have a significant impact (Eeckloo et al., 2007; Ernst & Young, 2016; Frechette et al., 2020; Glouberman & Mintzberg, 2001; Mintzberg &

Glouberman, 2001; Samset, 2017; Samset et al., 2014; Snowden & Boone, 2007), making it crucial for both the setting of strategic goals and the success of healthcare projects. Hospital projects that demonstrate duality as both a construction project and an organizational change project require a combination of large number of different skills, knowledge, stakeholders, resources, and project perspectives. The research on stakeholder management in hospital construction projects has not been very active recently. Parallel to numerous ongoing hospital projects and national Social and Healthcare Reform (SHCR), more in-depth research is imperative (Reijula et al., 2016). However, it can be expected that the focus in research publications will also increasingly be on healthcare management and hospital projects.

Combining multiple perspectives and interests to achieve a common understanding of project goals and methods is extremely challenging (Kujala et al., 2021). Managing complex projects requires a high level of organizational and managerial skills (Davies & Mackenzie, 2014), and the skills required to manage hospital projects go beyond traditional project management capabilities, also requiring elements of change management (Bygballe, 2010; Hietajärvi et al., 2017b; Olsson, 2008). Good practical results have been obtained from highly collaborative integrated project delivery methods (Walker & Lloyd-Walker, 2016), which provide a concrete frame of reference that provides better-than-normal chances of success in complex and challenging projects with high uncertainty (Lahdenperä, 2017). Due to the complexity and uncertainty of such projects, the use of both integrated teams and project delivery methods (Brady, 2011; Koskela, 2000; Moore & Dainty, 2001; Walker & Rahamani, 2016) in the form of integrated project delivery (IPD) is a justified and proven option that enhances project value creation and collaboration methods, enabling deeper collaboration and early involvement and co-decisions of key stakeholders about shared risks, rewards, and targets (Lahdenperä, 2009, 2012; Olander & Landin, 2005; Ross, 2003).

Early stakeholder involvement and integration have been recognized as some of the most promising solutions to resolve problems in projects (Aapaoja et al., 2013; Baiden et al., 2006; Lahdenperä, 2012), and form project objectives. They enable stakeholders' contributions to value creation (Aapaoja & Haapasalo, 2014; Halttula et al., 2017; Hietajärvi et al., 2017a; Lehto et al., 2011) in a project's early phases, which has a positive impact on the achievement of the project objectives (Aaltonen & Kujala, 2010; Olander & Landin, 2005; Watt et al., 2010). Targeting goals and sacrifices, along with increasing the common benefits of all actors, are considered important determinants of value creation in a project network (Ahola et

al., 2008). Traditionally, the emergence of an inter-organizational project network is seen to begin at the project design stage (Hellgren & Stjernberg, 1995). Recent studies, however, have shown that a network begins to emerge at the early stage, or so-called front-end of a project (Artto et al., 2016; Morris, 2013).

With regard to the concept of integration in project management, there are challenges and problems related to collaboration and coordination (Söderlund, 2011). The collaboration challenges are mainly due to the conflicting goals and opportunistic behaviors of project actors as well as the difficulty in synchronizing project activities and adaptations (Söderlund, 2012). The greater the uncertainty of a task, the more information is involved in the interactions between decision-makers during the performance of the task (Galbraith, 1974). From the construction perspective, integration normally refers to collaborative working practices, methods, and behaviors that promote a working environment where information is freely exchanged between different participants (Baiden & Price, 2011). Organizations can increase their information processing capacities by setting in place integration mechanisms (Galbraith, 1974; Turkulainen et al., 2013, 2015) centralizing decision-making, standardizing processes, and implementing rules, standards, and plans (Turkulainen et al., 2013). In addition, they can encourage communication between units through meetings, cross-functional teams, and integrative departmental and liaison roles (Turkulainen et al., 2013). Therefore, integration could also be defined as the sharing and processing of information between different functional units (Turkulainen et al., 2013).

Earlier research has acknowledged the importance of the front-end phase for projects' success in relation to value definition (Artto et al., 2016; Davies, 2004) and co-creation (e.g., Aaltonen et al., 2015; Aapaoja & Haapasalo, 2014; Matinheikki et al., 2016; Williams & Samset, 2010), but unfortunately, it is insufficiently understood in detail (Williams et al., 2019). This is unfortunate because much of a project's premise and critical decisions are determined in the early stages of a project—here, we refer to the front-end stage of the project—in which the client develops the project definition and defines the commercial contract model, setting the foundation for value creation (Artto et al., 2016; Davies, 2004). As public projects, hospital projects control society's resources, so the importance of successful projects is emphasized both as a tool for desired development and in terms of monetary value (Samset & Volden, 2016; van Wee & Priemus, 2017; Volden, 2019).

The project strategy is formulated in the front-end phase. Long-term success is considered in terms of the strategic performance of a project, whether the project

is relevant to its users or sustainable throughout its life cycle (Miller & Hobbs, 2005; Samset, 2007; Samset, 2014; Samset & Dowdeswell, 2009). Choosing the right concept is said to produce strategic success in large public projects (Klakegg & Haavaldsen, 2011; Samset & Christensen, 2017). Therefore, several concepts for a defined need should be developed at the front end to ensure that all key solutions are considered (Samset & Christensen, 2017). This emphasizes the importance of evaluations at the front-end and the development of sound concepts that meet identified needs (Klakegg, 2010; Samset, 2010). The relationship between superior goals and project development is seen as a challenge to project strategies. This challenge needs to be addressed properly for projects to succeed (Morris et al., 2009). Therefore, the front-end phase of a hospital construction project—where the most critical decisions are made (Elf et al., 2015)—makes this phase important and challenging (Bygballe, 2010; Elf & Malmqvist, 2009; Elf et al., 2012, 2015), and it is critical for achieving both strategic and project success (e.g., Flyvbjerg, 2017; Volden & Samset, 2017; Williams et al., 2019), where value creation is reflected as a goal-oriented approach between stakeholders (e.g. Aaltonen et al., 2015; Edkins et al., 2013; Morris, 2013; Williams & Samset, 2010).

Regarding earlier research, it can be argued that simply providing an appropriate way to implement a collaborative project—by enabling early participation and interaction—with appropriate interoperability tools and methods by repeating "early involvement and integration," "focus on people", and "value for money" is simply not enough. There is a lack of systematic processes for planning and managing the front-end phases of hospital construction projects at a more detailed level. A more systematic and comprehensive process can help the client (here, we refer to the client as the focal organization responsible for leading the project) and project stakeholders define their goals and requirements more precisely so that value expectations and implementation concepts, as well as the resources and skills needed to succeed in value creation, can be defined at an early stage in the project. This dissertation is an effort to bridge this gap by focusing on enhancing value creation by investing in the front-end phase of a hospital construction project.

1.2 Objectives and scope

Against the presented background, the main aim of this research is to contribute to value creation in a collaborative hospital project at a detailed level, especially at

the project's front-end. In particular, this research has the following main research question:

> *How can stakeholders be involved and integrated at the front-end of a project, enabling "early involvement and integration" and a "focus on people," without losing sight of the background of the healthcare process and its goals, objectives, and structures.*

Discussion about who has the most comprehensive interest in a project's outcome, value, and impact is typically directed toward clients, no matter how difficult it is to determine. It is the client who initiates the project by defining feasibility studies, planning, and forming further commercial contract models about how to achieve the outcome of the project. After these initiative activities, the client also has decisive responsibilities throughout the operation of a project. There is a substantial amount of research available on holistic perspectives, and at a very detailed level; however, detailed contributions may overburden practical project management if all details are aimed to be followed in the same project.

This dissertation addresses the nature of a hospital construction project that correlates healthcare processes, which are complex socio-technical systems in which the challenging task of clients is to integrate heterogeneous actors into both the development of new facilities and organizational changes in a healthcare organization. The empirical context of this study is the case of a hospital construction project consisting of separate collaborative construction projects during both nationwide social and healthcare reform and the hospital's organizational change. However, since the objectives and requirements for the hospital initially come from the healthcare process, the first original study has a wider scope as a stakeholder analysis of the university hospital reform program. In this context, the diversity of stakeholders makes collaboration a fundamental activity at the front-end. Earlier research outlines the importance and benefits of early involvement and integration in hospital construction projects. There is extensive literature on different methods for collaboration, where the early involvement and integration of stakeholders at the front-end have been recognized as important. This study elaborates on the previous general understanding of why early involvement and integration should occur, especially in the early stages of hospital construction projects, as well as the previous understanding of the role of clients in hospital construction projects.

This research integrates four interrelated original studies of the stakeholder landscape (both in the healthcare process and at the project level), the front-end

phase of the project, and interoperability tools and methods. These were selected because of their importance in managing a collaborative project in the multidisciplinary stakeholder environment, which requires defining the client's pertinent managerial activities in the front-end phase along with the necessary tools and methods to succeed in stakeholder integration and value creation, i.e., defining value co-creation settings. The interaction between and logical order of these four original studies is shown in Figure 1.

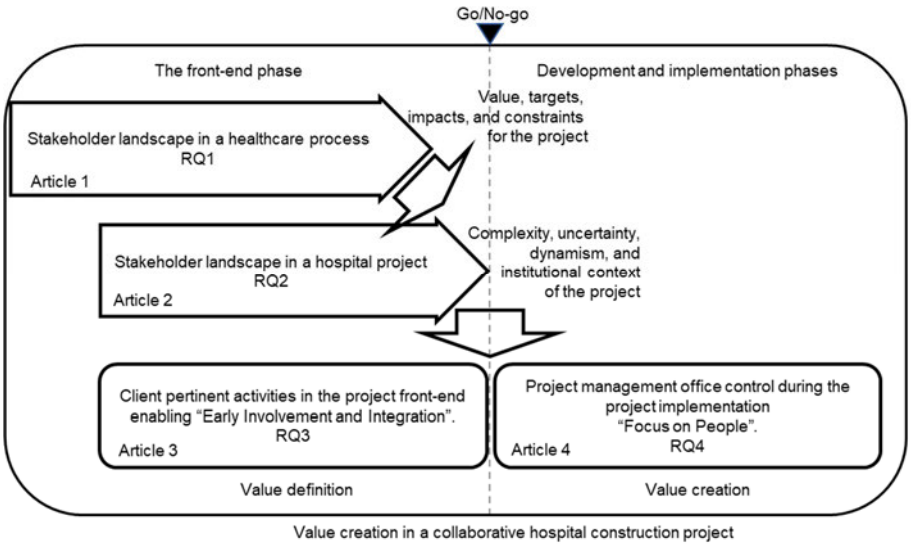

Fig. 1. The research framework.

This research was planned and performed through four original studies providing contributions to each research question (RQ) that finally compiled the research findings as a whole (Table 1). To meet the overall objective, the research questions must be answered. The positioning of the research questions within the research framework is also presented in Figure 1.

Table 1. Research questions of this study.

RQ#	Research Question
RQ1	What kind of stakeholder landscape depicts the healthcare process, and what are its implications for collaborative value creation?
RQ2	What kind of stakeholder landscape depicts hospital construction projects, and what are its implications for collaborative value creation?

RQ#	Research Question
RQ3	What are the critical management activities of the client in the front-end phase of a hospital project that enable early integration and involvement?
RQ4	What are the key elements, tools, and methods in collaborative projects that enable a focus on people?

The original studies and respective research questions are formed from four perspectives. At first, the focus is on the stakeholder landscape in healthcare processes (Article I). The study of the stakeholder landscape in the healthcare process was meant to lay the foundation for the entire hospital construction project. It was evident that the high-level values, objectives, goals, and constraints were critical to understand for the hospital project, especially for the front-end. In the second original studies, the stakeholder analysis and landscape in hospital construction project (Article II) analyses are followed in more detail, with an emphasis on the complexity, uncertainty, dynamism, institutional context, and overall stakeholder landscape implications for hospital project management. After the previous one, the third original study analyses pertinent management activities in the project's front end, creating the foundation for collaborative value creation, which is specifically important since the client has the greatest responsible for the definition of the project and its implications. The fourth original study focuses on describing "early involvement and integration" at a more detailed level and continues to the theme of leadership, outlining how a "focus on people" can be achieved in practice. The original Articles III and IV aim to simplify, at a detailed level, what these two very common phrases mean at a practical level. The research questions are related to each other, and together, they strive to accomplish the objective of this dissertation. There could have also been alternative routes on offer; however, this path follows what was planned at the beginning of the research. The original setup for the research did not change significantly when it was carried out. Although the focuses of the articles are different, together, they form a specific subject matter.

This dissertation discusses the enhancement of value creation and achievement of project objectives more effectively in a hospital construction project through stakeholder landscape analysis, early involvement, and collaboration in an inter-organizational project environment. The main focus of this dissertation is on analyzing the nature of the client's role in value creation by identifying the client's pertinent stakeholder involvement and integration activities in the front-end phase of a hospital construction project.

Table 2. Overview of research papers.

Article	RQ#	Article title	Journal
I	RQ1	Stakeholder landscape in the public healthcare process—Challenges, elements, and impacts on stakeholder management.	Manuscript submitted for publication
II	RQ2	Stakeholder analysis and landscape in a hospital project—Elements and implications for value creation.	International Journal of Managing Projects in Business
III	RQ3	Clients' pertinent stakeholder activities in the front-end phase of a hospital construction project.	Manuscript submitted for publication
IV	RQ4	Organizing methods enabling the integration of value creation in complex projects.	Construction Innovation

The thesis incorporates four separate original studies with dedicated research questions that contribute to the main objective of the present research (Table 2). Articles I and II explore the nature of the healthcare environment and managerial issues at both the process and project levels, addressing the themes of complexity and management challenges due to multiple stakeholders. However, the issues are studied more at the overall level. The main focus of the Article I is discussing how to analyze the challenges of the healthcare process and identifying the managerial implications for managing complex environments. The Article II is somewhat similar to the Article I, but it studies stakeholder management in a hospital construction project and management challenges due to multiple stakeholders.

The Article III focuses on the identification and validation of the key management activities in the front-end phase of a hospital construction project to enable early involvement and integration, thereby enhancing value creation. As the aim of this dissertation is to show how value creation can be enhanced in the front-end phase of a hospital construction project, this article aims, in particular, to identify the key management activities defined by the client and their contributions. At the same time, the Article III forms the constructive part of this research by introducing a structured framework designed to define the key management activities during the different phases of a collaborative project.

The Article IV focuses on identifying the key elements and methods that enable early involvement and team integration in a complex hospital construction project. This article focuses more on interoperability tools and methods, providing a project environment with a "focus on people"—emphasizing the role of people in value

generation—whose value creation is enhanced by defining the tools and processes used in a hospital construction project.

To summarize, this dissertation addresses the research problem through four individual research questions. Each research question attempts to address the research problem from a different viewpoint, yet in an interconnected manner. In addition, each research question is discussed in scientific articles, some of which have been published in international journals in the field of project management.

1.3 Research process and approach

The overall research approach in the literature primarily refers to the way the data are collected and analyzed. In scientific thinking, it is essential to carefully consider information: how it is produced, described, and justified (Eriksson & Kovalainen, 2008). Scientific research always has its philosophical perspectives, especially when the researcher acts as an "involved researcher" in this research. The author of this thesis has acted as the director of the investment program and the client's representative in the hospital construction project that is the subject of the case study in this thesis. The researcher always has his or her own view of the research problem or phenomenon, which directly affects the available research methods and thus the nature of the information produced. Researchers who approach scientific research from a philosophical perspective face ontological, epistemological, and ethical questions. According to Lancaster (2005), there are several questions to consider: how can a phenomenon based on scientific research be believed and known, how can scientific reality be trusted and known, and what makes the acquired knowledge scientific? It is also important to consider when a researcher abuses a research subject or acts unethically against the scientific community (Lancaster, 2005).

An ontology can be understood as a reality in which the phenomena studied are understood to reside and as an understanding of where those phenomena are located in that reality. In scientific research, ontological preconceptions of the nature of the studied topics are typical. The ontology guides one to answer the question, is reality objective or subjective? Ontology investigates the selection of theories and concepts and what has influenced their selection (Anttila, 2005; Harisalo, 2008). The researcher's assumptions relate to the reality that a researcher believes in and how they see the research object (Saunders et al., 2016). Epistemology, on the other hand, is interested in what knowledge is, what its

sources and limits are (Eriksson & Kovalainen, 2008), and how knowledge of reality can be produced (Guba & Lincoln, 1994).

In the Articles I–IV, the literature reviews typically served as analytical frameworks for the empirical studies, while the subsequent empirical material collections and analyses were implemented as a case study setup. Meanwhile, the unit of analysis was a hospital construction project (the healthcare process in the first original study), following Ketokivi and Choi (2014). Overall, this study follows the main logic of constructive research (Kasanen et al., 1993) as a nature of design science, aiming to deliver normative management guidelines for complex collaborative projects.

When reality is assumed to be based on the different perceptions and experiences of each person, which change with time and context, it represents an ontological assumption of subjectivism, which assumes that social reality is created by social actors through social interaction (Eriksson & Kovalainen, 2008). While the social world is assumed to exist as a distinctive and separate reality, it represents another ontological assumption, objectivism, upon which this research mainly rests (Figure 2); this viewpoint assumes that the social world exists independently of people and their actions and activities (Eriksson & Kovalainen, 2008). Objectivist ontology holds that social reality is external to the researcher living in it (Bryman & Bell, 2015). However, in the research theme dealing with the formation of the front-end phase of a project and interoperability tools and methods enabling early involvement and integration, reality is seen to be based on observations and experiences that can vary from person to person and change over time and context (Eriksson & Kovalainen, 2008). Thus, reality is constructed by social actors through social interactions in which people create partly common meanings (Eriksson & Kovalainen, 2008; Saunders et al., 2008). In Articles III and IV, then, the ontological view is closer to social constructionism and subjectivism than to objectivism.

Epistemology, on the other hand, is interested in what knowledge is and what the sources and limits of knowledge are (Eriksson & Kovalainen, 2008). Epistemological concerns relate to assumptions about the extent to which objective information can be obtained to measure or quantify social phenomena (Jones & Gatrell, 2014). In positivist epistemology, reality is constituted of observable material things; in interpretivism, reality is socially constructed, and knowledge is available only through social actors; and in critical realism, reality is taken as material, but people interpret it differently in different times and contexts (Eriksson & Kovalainen, 2008). When dealing with the stakeholder landscape both at the

process and project level (Articles I and II), critical realism is an appropriate epistemology in which reality is seen as material, and it is recognized that people can interpret it differently at different times and in different contexts (Eriksson & Kovalainen, 2008), with an emphasis on contextual conditions (Smyth & Morris, 2007). However, in the case of clients' pertinent managerial activities in the front-end phase of a hospital construction project (Article III) and interoperability tools and methods enabling early involvement and integration (Article IV), as reality is socially constructed, knowledge becomes available through social actors (Eriksson & Kovalainen, 2008). Thus, the relevant epistemology is closer to interpretivism than to critical realism.

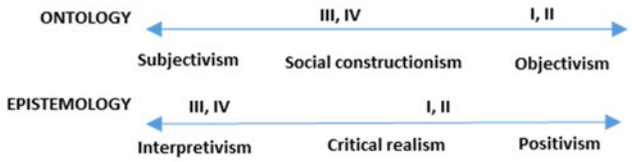

Fig. 2. Ontological and epistemological positions of the original studies in Articles I–IV.

The action design research (ADR) (Sein et al., 2011) approach was selected in two original studies because of its high level of practical relevance and the possibility of gaining in-depth knowledge about the research phenomenon. The aim was to obtain profound knowledge from inside the project. The approach aims to develop prescriptive means to better understand and solve the identified challenges of the front-end phases in hospital construction projects, together with the practitioners from an internal perspective. As part of the studied phenomenon, the first author in all the original studies allows fundamental access to understand the root causes and issues within the context and phenomena, enabling a profound understanding and rich data (cf. Sein et al. 2011). The first author had first-hand knowledge of the content and details of the project, and the inevitable encounter with various stakeholders made it possible to focus the research on the right questions for the right stakeholders. The first author had a critical management responsibility in the case project and operated as an "involved researcher," enabling a profound understanding of the progress of the project, e.g., the decision-making and documentation involved. Other authors in the original studies acted as "outside

researchers" to ensure the objectivity of the analysis and results (see, e.g., Walsham, 2006). In addition, several members of the case study project organization participated in the development of the research through workshops in which the findings of this study were evaluated, developed, validated, and verified.

1.4 Research strategy and data collection

The research strategy of this dissertation is an inductive case study of a large hospital construction project that demonstrates duality as both a construction project and an organizational change project focusing on understanding the dynamics that occur in individual environments (Eisenhardt, 1989). The case study consists of a unit of the Finnish Hospital District, which is a consortium owned by municipalities. In 2012, an extensive and long-term hospital renovation program was launched with the main goal of improving the hospital's cost efficiency, productivity, and the quality of healthcare by reforming the operating models and organizational structures and building a new hospital. Two construction sub-projects with a total duration of five years were launched in 2018. Capital expenditures for both projects will account for more than 600 million euros. The new hospital will spread over 115,000 square meters and meet very high quality standards. During the development phase, more than 200 medical and non-medical personnel, along with several architects and engineers, participated in a collaboration to define the requirements and needs of a new hospital. During the implementation phase, more than 600 people worked simultaneously on both the site and the project office. In the development phase, an execution plan for the implementation of the project was prepared together with the client and project stakeholders. The target cost and the most significant risks and opportunities were assessed together. During the development phase, it was also ensured that the requirements set by the users (both medical and non-medical staff) for the facilities, equipment, and systems were taken into account and that the parties committed themselves to achieving them along with the goals set by the client.

A single case study (Table 3) is appropriate when the case studied requires special attention to understand and clarify (Voss et al., 2002). Thus, a case study research method is suitable for this empirical study. This is because it studies both change management and project management as modern, complex social phenomena from a holistic and real-life context in a complex project environment (Yin, 2014), in which multiple sources of evidence are used and the boundaries between the phenomenon and context are not clear (Yin, 2014). In addition, the

case study strategy is suitable for research that covers practice-based issues in which respondents' experiences are important. The aim is to discuss the phenomenon in depth by understanding the real environment (Yin, 2014).

Table 3. Facts about the case sub-projects.

Facts	Construction sub-project	
	Alliance A	Alliance B
Duration	1/2019–12/2023 (estimate: 07/2023)	7/2019–12/2023
Cost (target/estimate)	264.5 M€ / 260 M€	375 M€ / 370 M€
Alliance partners	NOHD (Client), Main Contractor, Building Service Contractor, Building Automation Contractor, Architectural Design, Civil and Mechanical Engineering	NOHD (Client), Main Contractor, Building Service Contractor, Building Automation Contractor, Architectural Design, Civil and Mechanical Engineering
Project phase during data collection, interviews, and workshops	Implementation phase (under construction and assembly) between 2019 and 2022	Implementation phase (under construction and assembly) between 2019 and 2022

This research began by examining the stakeholder landscape at both the healthcare and hospital construction project levels and their implications and challenges for determining the objectives and requirements of a hospital project, i.e., value definition in general, in a single case study. The study then proceeds to a more specific area in the same case to look at what management activities the client should consider to allow for stakeholders' early involvement and integration into the common value-creation process. The first two research questions aim to provide an overall understanding of the hospital project's stakeholder landscape and its impact on the chosen project's implementation concept. The third promotes stakeholders' early involvement and integration and how to enhance value creation by highlighting and investing in these topics. The fourth and final research question asks what key elements and project management tools and methods enhance stakeholder integration and motivate people to focus on value creation in a collaborative project.

We selected ADR as the approach in the two original studies because of its high level of practical relevance and the possibility of gaining in-depth knowledge about the research phenomenon. The aim was to obtain profound knowledge from inside the project. Our approach aims to develop prescriptive means to better understand

and solve the identified challenges of the front-end phase in hospital construction projects, together with the practitioners from an internal perspective.

This thesis is based on four original studies (Articles I–IV), in which all empirical data collection (Table 4) followed an inductive case study design (Eisenhardt, 1989). The research in Articles I and II was conducted with a qualitative and inductive approach (Bryman & Bell, 2011). Empirical data were collected in three dimensions: project internal documentation, thematic interviews, and surveys. The literature related to hospital projects, stakeholder analysis and management, stakeholder salience, and landscapes is summarized, informing the qualitative design of the study. Our case is parallel to several ongoing new hospital projects in Finland, and alongside the national SHCR reform, a more in-depth study is now possible when empirical evidence is available. Therefore, we conducted our study using a qualitative approach (Bryman & Bell, 2011), adapting the role of the researcher from action design research (ADR) (Sein et al., 2011).

Article III follows the principles of ADR for a case study, being iterative in nature and aiming to improve the overall effectiveness of the project planning. We selected ADR because of its high level of practical relevance and the possibility of gaining in-depth knowledge about the research phenomenon. Our approach aims to develop prescriptive means (i.e., managerial propositions in this study) to better understand and solve the identified problem of early involvement and integration in hospital construction projects together with the practitioners. With this in mind, we began by building propositions inductively based on the first author's experiences in the case project. We then intervened in the empirical context to evaluate and verify the propositions together with the case project stakeholders, responding to real challenges in the case project's organizational setting. In addition, several members of the case study project organization participated in the development of the research through two workshops in which the findings of this study were evaluated, developed, and verified. Table 4 summarizes the research strategy and data collection methods.

Again, in Article IV, the choice of ADR was natural because the main author played a central and responsible role in the project, allowing the study to produce in-depth insight into the content and details of the project. We also considered other approaches but ended up with ADR because the selection, use, and reflection on the tools and methods used was a key responsibility of the author. In this way, we can describe the root causes of the problems behind the tools and methods used. In addition, another author acted as an "external researcher" to ensure the objectivity and balance of the analysis and results. Naturally, several members of the case study

organization were also involved in the application of the project's tools and methods, ensuring applicability in the right direction and enabling decision-making in the best possible way for the project. The selection of ADR as a method is also rooted in the holistic nature of the research problem since its primary focus is on depicting and solving real-life problems (Sein et al., 2011). Two workshops were organized to evaluate the direct and indirect challenges and benefits of the four applied methods and to explain how different methods enable value creation. The actual timelines of the data collection and real hospital construction projects are presented in parallel in Figure 3.

Table 4. An overview of the research strategy and data collection methods.

Article	Research strategy	Data collection method
I	Single case study	Qualitative data from a case project. Primary data: 15 semi-structured interviews (key staff representatives of NOHD and board of directors for NOHD) and participation in the validation workshop (one validation workshop with five members of the board of directors). Secondary data: project-related documentation (e.g., decision documents of the council and the board of NOHD, purchasing documents, agreements, minutes of steering group meetings, project execution plan, and project management procedures).
II	Single case study	Qualitative data from a case project. Primary data: 14 semi-structured interviews (key staff representatives of NOHD and representatives of service providers at the project level). Secondary data: project-related documentation (e.g., decision documents of the council and the board of NOHD, purchasing documents, agreements, minutes of steering group meetings, project execution plan, and project management procedures).
III	Single case study following the principles of ADR	Qualitative data from a case project. Primary data: Case description and eight inductively created propositions based on incidents in the project and the first author's experiences in the case project. Three semi-structured group workshops (two parallel alliance sub-projects and executives of NOHD) were attended by members of the alliances (in total, 12 members) and executives of NOHD (in total, five members). Secondary data: project-related documentation (e.g., decision documents of the council and the board of NOHD, purchasing documents, agreements, minutes of steering group meetings, project execution plan, and project management procedures).

Article	Research strategy	Data collection method
IV	Single case study following the principles of ADR	Qualitative data from a case project. Primary data: The semi-structured group workshops (two parallel allied sub-projects) were attended by members of the alliance steering groups (in total, eight organizations and nine members) and project management teams (in total, eight organizations and 14 members). Secondary data: project-related documentation (e.g., decision documents of the council and the board of NOHD, purchasing documents, agreements, minutes of steering group meetings, project execution plan, and project management procedures).

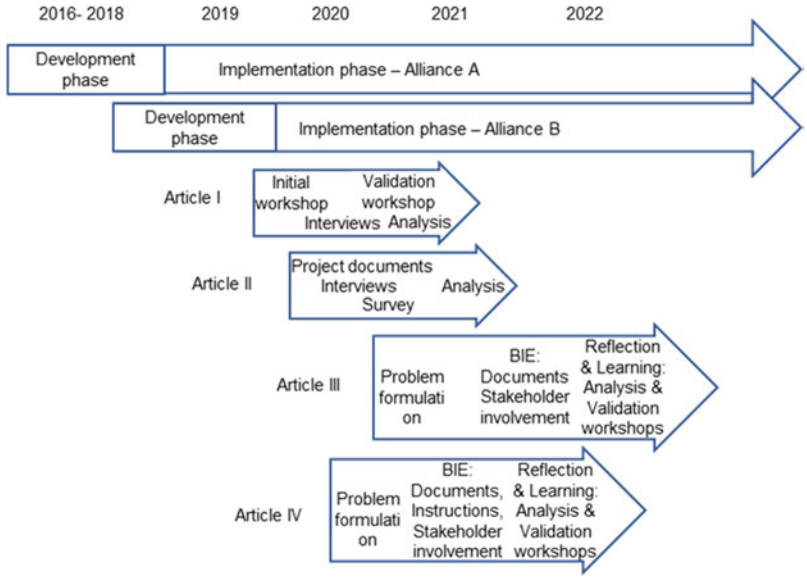

Fig. 3. The actual timelines of the data collection and real hospital construction projects.

In conclusion, this dissertation achieves its purpose through empirical studies conducted in a qualitative manner. The literature and previous research were studied to gain a solid foundation for and understanding of the topics, phenomena, and discussions to use them as the knowledge basis for the empirical study.

2 Literature review

2.1 Theoretical framework

This chapter provides an overview of the proposed theoretical foundation and literature streams that form the basis of this dissertation.

The dissertation begins with the stakeholder approach (e.g., Aaltonen, 2010; Cleland, 1986; Freeman, 1984; Mitchelle et al., 1997), studying collaborative project delivery arrangements (Lahdenperä, 2012; Walker et al., 2017) in which early involvement (Aapaoja, Haapasalo, & Söderström, 2013; Baiden et al., 2006; Lahdenperä, 2012) and integration (Baiden & Price, 2011; Egan, 2002; Walker & Lloyd-Walker, 2015; Walker & Rahamani, 2016) play a key role. It analyzes how this approach relates to the concept of Lean construction in value creation (e.g., Koskela, 2000; Koskela et al., 2002; Womack & Jones, 1996) and especially in relation to the front-end (e.g., Miller & Hobbs, 2005; Samset & Volden, 2016; Shiferaw, Klakegg, & Haavaldsen, 2012) of the project, where the client defines the goals, identifies the necessary skills and resources, and decides on the project implementation concept (Edkins et al., 2013; Flyvbjerg, 2013; Morris, 2013; Olsson & Samset, 2006). These discussions and concepts are applied to the extent necessary to provide an adequate understanding of how to enhance value creation in the early stages of a complex inter-organizational construction project, such as a hospital construction project.

In addition, by understanding the key theoretical foundations of this study, it is possible to discuss, based on empirical evidence, what kinds of management activities are needed in the planning, organization, and management of a hospital construction project at the front-end, i.e., in the strategic pre-project stage, where value creation is reflected in the targeting of objectives among actors (Aaltonen et al., 2015; Edkins et al., 2013; Morris, 2013; Williams & Samset, 2010). Figure 4 illustrates the theoretical framework of this research.

Fig. 4. Theoretical framework of this dissertation. The area inside the dashed line illustrates the concepts within the scope of this research. The outside area is out of the scope, but the concepts within constitute related research and will therefore have some bearing on the current study.

Stakeholder management itself is a broad entity. This research focuses on the need for stakeholder analysis and landscaping to gain a comprehensive understanding of the complex project environment and extensive stakeholder network of a hospital construction project. Not only does it contribute to a better understanding of using the stakeholder landscape framework to manage the healthcare process more efficiently, but professionals can also use it to analyze, evaluate, identify, and classify their projects based on the landscape characteristics of stakeholders (Aaltonen & Kujala, 2016).

Implementing collaborative projects has been seen as an effective way to implement the Lean philosophy and ideas in construction based on the Toyota Production System (Liker & Morgan, 2006) - especially in complex project environments. To integrate stakeholders and create customer value (Jorgensen & Emmitt, 2009; Lichtig, 2006; Matthews & Howell, 2005; Tíllman et al., 2012), it is important to include in this research an approach to interoperability tools and methods used to improve early involvement and integration. Additionally, within the Lean construction literature, integration is an evolving field that is heavily promoted as a means of project delivery (e.g., Ballard, 2008; Elfving, 2003; Jorgensen & Emmitt, 2009; Koskela, 2000). All the above can be identified and taken into account at an early stage of the project - before the project is even set up

- so it is important to consider how value creation can be enhanced in the front-end phase of a complex hospital construction project. This dissertation does not deal very deeply with Lean philosophy or the stakeholder approach, but rather discusses them at the ideological level, so specific Lean tools and production systems, as well as stakeholder management, are not addressed in this study.

To achieve the purpose of this research and understand how the client's pertinent stakeholder activities in the front-end phase can be used to enhance value creation in a hospital construction project, the concept of the stakeholder landscape at both the healthcare process and hospital project levels should be discussed. More specifically, the goal of this dissertation is to present the concrete actions of a client or project management at the front end of a hospital construction project to facilitate value co-creation through early involvement and integration.

Overall, this chapter provides an overview of the literature and theories applicable to this study. This chapter reviews the literature and existing research and theories to explain the content and purpose of this research to readers. However, to keep this study as clear and consistent as possible, some aspects of the theory have been omitted from the discussion because they are not considered relevant.

2.2 Project stakeholder approach

Projects are generally and typically defined as temporary organizations (Bakker, 2010; Cleland & Kerzner , 1985; Grabher, 2002; Jacobsson et al., 2015; Ligthart et al., 2016; Lundin & Soderholm, 1995) who work together for some time to achieve goals with budget, performance requirements, and constraints (Bourne, 2005). The concept of a project usually includes features such as uniqueness, funding, materials, people, location, stakeholders, and the environment, all of which can bring specific features that need to be considered and identified at the beginning of the project (Cova & Salle, 2005; Turner, 1999). Most of the current large-scale projects are carried out in very demanding and complex environments and are carried out by project organization, in which several interdependent stakeholders - with different professional and occupational backgrounds and with different level and types of interests, goals and socio-cultural backgrounds (Aaltonen 2010, Cornick & Mather 1999) - work together. The afore mentioned features create three essential pressures on projects especially to the project management; they involve uncertainty, create a need for integration and are implemented as a matter of urgency (Turner, 1999), and each project has a certain complexity and novelty (Manning, 2017).

Project networks include different participating groups, each with their own needs and requirements. Representatives of these groups are called project stakeholders. Both the Stanford Research Institute (1963) and Rhenman (1964) created the roots and idea for stakeholder theory, which Freeman (1984) and Cleland (1986) favoured as the concept of stakeholder management, an accepted theory that has evolved from business management and is designed to describe, understand, analyze and manage stakeholders. In project management, it is widely acknowledged that the interests of key stakeholders or even all stakeholders must be taken into account for a project to succeed (Achterkamp & Vos, 2008). The success of construction projects (Mok et al., 2016) depends on meeting the expectations of stakeholders throughout the project life cycle (Cleland, 1995), including clients, project managers, designers, subcontractors, suppliers, funding bodies, users, owners, employees and local communities (Newcombe, 2003).

In the previous stakeholder literature, various definitions of stakeholders from a broad to a narrow perspective have been presented. In broad definitions, stakeholders are organizations or individuals who influence or are affected by a project. Narrow definitions usually focus on the nature of the interest or contribution that a particular stakeholder belongs to "relevant group" to the project. These definitions focus on the stakeholders who are participants in the exchange relationship (e.g., Hill & Jones, 1992) or have a legitimate claim (Cleland, 1986). Building on the classical work of Freeman (1984) project stakeholders are defined as the people and groups affected by the project or in a position to influence it (Anderssen, 2008) regardless of whether they have an official role in the project or not (Loch & Kavadias, 2011). The broad view is based on the observation and empirical reality that almost anyone can or will have a significant impact on companies (Aaltonen 2010; Mitchell et al., 1997). Therefore Mitchell et al. (1997) argue that a narrow view of stakeholders is more realistic and emphasize the practical reality of limited resources and the limited patience of managers to deal with external constraints. However, Freeman's (1984) definition does not comment on the relationships that stakeholders have with the organization, nor on whether or not stakeholder claims are justified (Aaltonen 2010).

Commonly stakeholders can be divided into internal and external (e.g. Cleland, 1986; Freeman, 1984; Gibson, 2000) or primary and secondary (Clarkson 1995) while Fottler et al. (1989) also described interface stakeholders as the third category. Internal or primary stakeholders are those directly involved in an organization's decision-making process and controlling resources (e.g. owners, customers, suppliers, employees) and are typically formal members of the project coalition.

External or secondary stakeholders are those affected by the organization's activities in a significant way (e.g. neighbors, local community, general public, local authorities), and can be considered as informal members of the project who do not have direct control over the resource but have the opportunity to make a positive or negative impact on the project (Aaltonen & Kujala 2010; Cleland 1986, Cova & Salle 2005). Interface stakeholders are those who operate both internally and externally in the organisation, that is, those who are at the interface between the organisation and its environment (Fottler et al., 1989).

There are other definitions of project stakeholders in the literature, but in this study, the above description provides a sufficient understanding of the nature of project stakeholders in a hospital construction project. From a strategic project management perspective, it is important to identify stakeholders who need more management attention and who do not (Mitchell et al., 1997).

2.2.1 Stakeholder management

The complex and volatile nature of projects requires a systematic approach and appropriate skills of project managers to take into account the interests of stakeholders and to obtain the best possible value from the results of the project. Stakeholder management is seen as an effective way to do this by bringing stakeholder concerns to the surface and developing strong stakeholder relationships in complex project environments (Bourne & Walker, 2005). Project stakeholder management can be defined as any appropriate activity aimed at project stakeholders to promote the success of the project (Eskerod & Jepsen, 2013), so a key issue in project stakeholder management is managing its stakeholders (Aaltonen et al., 2008). The two main functions of project stakeholder management, which are described extensively, are stakeholder analysis and interaction with stakeholders in an appropriate way (see Cleland, 1998; Eskerod & Huemann, 2014; Eskerod & Jepsen, 2013; Gareis, 2005).

In the field of project management and construction sector, many authors have clearly emphasized the exceptional importance of stakeholders (Beringer et al., 2013; Cleland, 1986; Freeman, 1984; Littau et al., 2010; Savage et al., 1991; Winter et al., 2006) and their involvement in projects for project results (e.g. El-Gohary et al., 2006; Newcombe, 2003; Olander & Landin, 2005). Nonetheless previous research has shown that many projects lack strategies, plans and methods for managing stakeholders (Karlsen, 1998). Stakeholder management is often characterized by spontaneity and causal actions that in some situations are not

coordinated and discussed within the project team. The result of this practice is often unpredictable. To address this challenge, a number of stakeholder management methods and guidelines have been introduced (Cleland, 1986; Gilbert, 1983; Jiang et al., 2002); Savage et al., 1991), although in many projects there is no formal and systematic stakeholder process in the project (Karlsen, 2002). These guidelines include the implementation of the planning, organization, motivation, guidance, and management functions of resources used to cope with stakeholder strategies.

Stakeholder management requires an organization to communicate and interact with multiple stakeholders by considering and balancing their core interests (Freeman, 1984; Goodpaster, 1991; Logsdon & Wood, 2000). According to the literature, companies, causes, interests, and pressure groups must manage their relations with those external entities that can influence the achievement of their goals (Moloney, 2006). Stakeholders who use their power and intentions influence the results of the project according to their interests and expectations (Aapaoja & Haapasalo, 2014; Olander & Landin, 2005). The final value of a project is created or is affected together with all participants, and is not limited to monetary value, but also to long-term social actors who do not actively participate in the project (Laursen, 2018). However, all of the project stakeholders have their own goals, expectations, interests, design horizons, and motives that may be aligned or inconsistent and thus contribute to value creation (Artto et al., 2008). Therefore, projects should be managed as multiplayer and multi-technology constellations with an emphasis on value creation (Zhai et al., 2009). It is therefore essential to formulate a process for stakeholder management and stakeholder analysis and commitment to project achievement and participation in value creation (Yang et al., 2018). However, in several projects, stakeholder management and analysis have been understood to some extent as the same process (Aaltonen, 2010), which is not the case. The stakeholder analysis should include at least the following: identification, characterization and classification of stakeholders, and the development of management approach formulation, and decisions on stakeholder management (e.g., Cleland 1986, Karlsen 2002, McElroy & Mills 2003), and sufficient information to form a strategy for managing relationships and interactions between stakeholders (Aaltonen, 2010). The next section further describes the stakeholder analysis.

2.2.2 Stakeholder analysis

A key premise behind the concept of project stakeholder management is that project manager should consciously try to influence the project stakeholders in order for them to contribute to the project. Therefore, identifying stakeholders and analysing their requirements, expectations, wishes, and concerns related to the project (Jepsen & Eskerod, 2009) is an important and an essential part of stakeholder management (Aaltonen, 2011; Freeman, 1984; Jepsen & Eskerod, 2009; Mitchell et al., 1997). The goal of conducting a project stakeholder identification and analysis in increasingly turbulent and unpredictable environment, is both to understand how stakeholders can be managed and to increase the project team's ability to anticipate project opportunities and challenges when the project team still has time and opportunity to make changes (Aaltonen et al., 2008; Jepsen & Eskerod, 2009).

Stakeholder analysis plays an important role in sourcing resources for the project as well as satisfying project stakeholders (Eskerod & Jepsen, 2013). Stakeholder analysis is also an integral part of the stakeholder management process, as it allows project teams to understand the stakeholder environment and develop appropriate engagement strategies (Mok & Shen, 2016). Conducting a stakeholder analysis serves to help project representatives achieve the project by identifying ways to obtain the necessary financial and other resources, including avoiding retaliation, and to help project representatives understand the project's interests and concerns with project stakeholders. Stakeholder analysis is to assess and understand stakeholders about how an organisation is made or to determine their relevance to a project, leading to an analysis of how stakeholder influence the decision-making process and how to manage different types of stakeholders (Brugha & Varvasovsk, 2000). Stakeholder analysis has been described as a five-step process comprising identifying key sectors and stakeholders, describing stakeholder interests and resources, analysing and classifying stakeholder characteristics, reviewing stakeholder dynamics, and developing stakeholder management strategies (Ackermann & Eden, 2011; Bunn et al., 2002; Cadle et al., 2010; Cova & Salle 2005). Jepsen and Eskerod (2009) define the key activities of stakeholder analysis as identifying key stakeholders, their input, and their expectations and power in relation to the project, in order to make decisions about appropriate strategies to influence each stakeholder group. The results are typically presented as stakeholder maps, along with the power-interest matrix of the stakeholders (Mitchell et al., 1997; Olander & Landin, 2005; Olander 2007), not

only as organisational charts. For example, a project stakeholder register can be used for stakeholder identification (see Eskerod & Jepsen, 2013; Trentim; 2013).

2.2.3 Stakeholder salience

Identifying stakeholders' impact on project outcomes and decisions is a key issue in stakeholder management (Olander & Landin 2005, Walker et al., 2008). The impact can be assessed using a stakeholder identification and salience framework (Agle et al., 1999; Mitchell et al., 1997) that identifies who the stakeholders are and how much managers should pay attention to them i.e., who and what really counts. Based on that the degree to which they are given priority over competing stakeholders and their claims can be distinguished (Aaltonen et al. 2008; Kinnunen et al., 2014; Mitchell et al., 1997). The more significant the stakeholder, the more attention management should pay on them (Aapaoja & Haapasalo, 2014), and the higher the degree of salience support affects the extent to which top management prioritizes competing stakeholders (Agle et al., 1999). Salience usually varies during the project, and therefore stakeholders can try to modify their salience features to make their voices heard (Mitchell et al., 1997). In particular, external stakeholders are usually those who participate in various activities to shape their salience to get their attention (Aaltonen & Kujala 2010). However, there is very little research available in salience dynamics along project progress.

Due to the variability in relative salience, they are not equivalent, so it is essential for project management to assess stakeholder salience in order to validate the requirements of different stakeholders. Mitchell et al.'s (1997) framework has three attributes that serve as a basis for stakeholder salience: *power* (P) of the stakeholder, *urgency* (U) of the demand made by stakeholder, and *legitimacy* (L) of stakeholder demand, and further divides stakeholders into eight classes (Table 5) depending on the attributes the stakeholders possess. The stakeholder salience framework indicates whether a stakeholder with one or more characteristics is more relevant to firms, so the salience refers to the extent to which managers prioritize competing stakeholder claims (Aaltonen et al., 2008).

Power determines the probability that one of the stakeholders will be able to carry out their will despite opposition, i.e. stakeholder A can induce stakeholder B to do something that B would not otherwise have done (Bourne & Walker 2006). The power of stakeholders may be due to their ability to mobilize social and political forces and their ability to manage organizational resources (Post et al., 2002). The basis of the power is seen primarily as the type of resource used, and

the more powerful the stakeholders, the more salient their requests are in the eyes of management (Aaltonen et al., 2008). It can be said that a stakeholder has *power* when it can force its will on the company, i.e. *power* is given to those who control the resources the company needs (Pfeffer, 1981), and *legitimacy* is achieved if organisational practices are consistent with the wider social system (Powell & DiMaggio, 1991; Scott, 1987; Scott & Meyer, 1983). However, *power* and *legitimacy* can occur together, giving authority to those who have both, but they can also occur separately. *Power* can also occur in many ways, so the structure of the project network and the role of stakeholders in the network must be taken into account. For example, external stakeholders can increase their power and visibility through the network (Aaltonen & Kujala, 2010).

Legitimacy is the perception or presumption that the functioning of the whole is desirable, appropriate, or expedient in a socially constructed system of norms, values, beliefs, and definitions (Aaltonen & Kujala 2010). Individuals, organizations, and society may consider legitimacy, and the more legitimate stakeholder claims are, the more likely they are to receive positive responses. (Mitchell et al., 1997). However, if the stakeholder does not have the power to demand implementation, it is not significant in the eyes of the project manager, even if the claim is justified (Mitchell et al., 1997). For example, the contractual relationship between internal stakeholders increases the power of internal stakeholders, and therefore external stakeholders who do not have a contractual relationship are usually ignored (Aaltonen & Kujala 2010).

Urgency is a concept based on two main features: the role of stakeholders according to their own requirements (Aaltonen et al., 2008; Mitchell et al*.,* 1997), and time sensitivity to how long it takes - and the degree of management delay that cannot be accepted by stakeholders - managers to deal with their demands (Gago & Antolin, 2004). Criticality suggests the importance of stakeholder requirements, thus, urgency is "the degree to which stakeholder claims call for immediate attention" (Mitchell et al., 1997), therefore *Urgency* can be understood as the interest of stakeholders or, in practice, that 'louder stakeholders' are attended to first. While urgency is not as concrete an attribute as power and legitimacy, it does not diminish its importance. Urgency determines the dynamics of stakeholder salience and the interactions between stakeholders (Mitchell et al., 1997).

Table 5. Stakeholder classes (Modified from Mitchell et al. 1997).

Stakeholder class	Definition	Salience attributes
Definite	A member of an organization's dominant coalition. Managers have a clear and immediate mandate to consider and give priority to their urgent claims.	P, L, U
Dominant	Influence is assured and it is clear that expectations of any of those stakeholders will matter.	P, L
Dangerous	These can be coercive and violent but also dangerous.	P, U
Dependent	These rest upon others for the power to carry out their will.	L, U
Dormant	Possess power to impose their will, but do not have any legitimate relationship or urgent claim and therefore their power remains unused.	P
Discretionary	There is no pressure on managers to engage in an active relationship with them, but they can do so.	L
Demanding	Could be irksome, not dangerous. No warranting more than passing management attention.	U
Non-stakeholder	Not salient- not counted as a project stakeholder	

Simply identifying stakeholders and assessing their salience is not enough (Johnson et al., 2008), because in principle the salience framework defines the level of stakeholder impact on a project only if they decide to take action. However, it is also necessary to assess the likelihood of stakeholders acting and expressing interest in project decisions (Olander 2007). Therefore, it is important that managers assess the interest of each stakeholder in expressing their expectations of project decisions and if there is the power to comply with it (Johnson & Scholes, 1999), and to identify the stakeholders who influence or are "able" to influence process decisions and their outcomes (Olander & Landin, 2005; Parent & Deephouse, 2007; Walker et al., 2008).

Power/interest matrix (Johnson & Scholes, 1999) categorized stakeholders depending on their power and their level of interest towards the project (Newcombe, 2003; Olander & Landin, 2005; Winch & Bonke, 2002). In addition, an impact/ probability matrix classifies project stakeholders according to their level of impact and probability (Olander, 2007). Aapaoja and Haapasalo (2014) further developed the salience evaluation (Mitchell et al., 1997) and impact/probability matrix (Olander, 2007) to bring together both perspectives. In their matrix (Figure 5), 'key players' are primary team members; 'keep informed' are key supporting participants, representing internal stakeholders for the process, while the external stakeholders include tertiary and extended stakeholders. In this matrix, the Y-axis indicates the level of visibility and impact, i.e., the more visible the stakeholder, the

higher the impact level. The X-axis describes the likelihood of stakeholders influencing / being able to participate in the project. The matrix shows what types of relationships project management can typically form with stakeholders depending on their level of impact and likelihood of action.

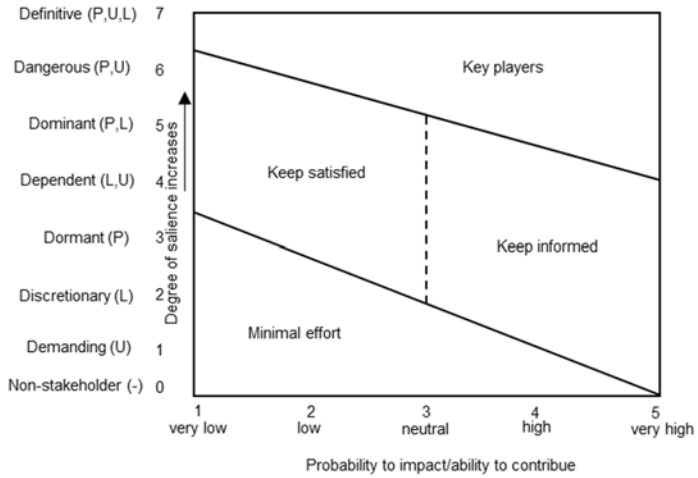

Fig. 5. Stakeholder assessment matrix (Modified from Aapaoja & Haapasalo, 2014).

2.2.4 Stakeholder landscape

Stakeholder management, analysis and mapping require a holistic approach. There has been an increase in the flow of research that defines, conceptualizes, synthesizes and makes sense of project complexity and its implications for project management (Bosch-Rekveldt et al., 2011, Geraldi & Adlbrecht, 2007, Geraldi et al., 2011; Maylor et al., 2008; Mikkelsen, 2021; Shenhar, 2001; Shenhar & Dvir, 1996; Vidal & Marle, 2008). Geraldi et al. (2011) describe project complexity with five dimensions comprising structural, uncertainty, dynamics, pace and socio-political complexity. Respectively, Bosch-Rekveldt et al. (2011) describe it with three dimensions comprising technical, organisational, and environmental complexity. Also, Ramasesh and Browning (2014) explains the project complexity with two key components which are element and relationship complexity having various sub-factors.

By systematically comparing and relating aforementioned three frameworks to general stakeholder research, Aaltonen and Kujala (2016) have developed a more

comprehensive conceptual framework - which increases the growing research flow - to describe the actors in the process more comprehensively and to explain the relationships between stakeholders and the possibilities to describe and classify project stakeholder landscapes. The stakeholder landscape can usually be described as a stakeholder map, so the map is only useful to some extent because it does not answer "what then" or "what next" questions. Aaltonen and Kujala (2016) proposed the overall model of the framework to identify characteristics of the stakeholder landscape in four key dimensions: *complexity, uncertainty, dynamism* and *institutional context,* with their sub-factors (Table 6).

Table 6. Stakeholder landscape attributes (Modified from Aaltonen & Kujala, 2016).

Key dimensions	Attributes
Complexity	Stakeholder element complexity
	Number of project stakeholders
	Variety of project stakeholders and their goals
	Stakeholders internal complexity
	Stakeholder relationship complexity
	Number of relationships among stakeholders
	Variety of relationships
	Patterns of relationships
	Relationships' internal complexity
	External stakeholder relationships
Uncertainty	Lack of information related to stakeholders and their relationship
	Project management's experience with respect to stakeholders and stakeholder analysis
	Analyzability of the stakeholder environment
	Ambigious information concerning stakeholders
Dynamism	Changes in stakeholders' attributes
	Changes in stakeholders' position
	Changes in relationships among stakeholders
	Emergent stakeholders and relationships
	Changes in appropriate ways of engaging stakeholders
	Changes in stakeholders' influence strategies
Institutional context	Stakeholders' local embeddedness
	Legitimized structures and processes for stakeholder engagement
	The nature of stakeholders' legitimized influence strategies
	Multiplicity of institutional environments
	Complexity of the stakeholders' interpretation process

The stakeholder landscape framework makes it possible to analyze what kind of stakeholder approaches exist, classify projects based on their stakeholder environments, and begin to assess the implications of different landscapes for stakeholder management and project management in general. The landscape framework is particularly valuable in assessing the stakeholder landscape at an early stage of projects, when many far-reaching strategic decisions need to be made about project objectives, processes and organization (Aaltonen et al., 2015). Preliminary stakeholder landscape assessments at this stage would support managers in making decisions about stakeholder engagement, possible stakeholder landscape modifications, and the overall strategy of the project (Artto et al., 2008). Naturally, the stakeholder landscape framework can also be used to support project stakeholder analysis work and stakeholder-specific decision-making throughout the project lifecycle. The framework also supports both the client and project-based companies in the overall decision making concerning the planning, organizing and resourcing of projects. Based on the challenges that their stakeholder landscape poses, right types of project personnel resources to projects can be defined and allocated. Depending on the complexity of stakeholder landscape a project may require extra resources and competence development in terms of stakeholder management activities and a heavyweight project manager with experience in various types of stakeholder and engagement processes (Bosch-Rekveldt et al., 2009; Geraldi et al., 2011; Remington & Pollack, 2007; Thomas & Mengel, 2008).

2.3 Lean construction

Many definitions of lean construction have been found in the literature reviews that demonstrate the positive growth of the lean methodology as well as its diversity, even it still lacks a general definition (Jørgensen & Emmitt, 2009). Lean thinking is a kind of new way to lead especially the construction industry, which has long suffered from problems such as cost overruns, delays, controversy, and low productivity (Lahdenperä, 2012; Pekuri et al., 2011). It is lagging behind in improving performance and optimization techniques and projects (Forbes & Ahmed, 2011; Glassop, 2002; Hayes, 2002; Koskela, 2000; Salminen, 2005) to improve construction productivity.

Creating the value with construction has a particularly strong place in the underlying philosophy of lean construction. Many people oppose the first exposure to lean thinking in construction because it comes from the manufacturing industry, and because of the belief that construction is different (Howell, 1999). On the

contrary, Ballard and Howell (1998) believe that the goals of lean thinking describe the management of dynamic projects. Howell (1999) found that managing construction on a Lean basis differs from typical current practice because it has clear goals for the delivery process, strives to maximize customer performance at the project level, it designs the product and process simultaneously, and applies production control throughout the project lifecycle. While current forms of production and project management focus on operations and ignore flow and value considerations (Koskela, 1992; Koskela & Huovila, 1997).

Based on the literature, it can be stated that after Koskela (1992) introduced the philosophy of productivity and quality to construction, it took nearly ten years of work by Koskela (2000) and detailed by Ballard et al. (2001) to formulate guiding principles for lean construction. The construction production theory proposed by Koskela (2000), and especially the concept of production as a flow, proved almost immediately useful when industry players reconsidered construction management methods (Ballard, 2000) and later management principles (Bertelsen & Koskela, 2002; Koskela & Howell, 2002). The goal of construction production systems - as we understand the projects - is to achieve three basic goals: to deliver the product, to maximize value, and to minimize waste (Koskela, 2000). Production system design includes principles such as: structured work to create value, understanding customer intentions, but also challenging and expanding customer intentions, increasing system control (Ballard et al., 2001).

Many researchers have emphasized that lean construction is about minimizing construction waste (Howell, 1999; Koskela, 2000; Lean Construction Institute [LCI], 2013; Lim, 2008) and meeting customer requirements (Howell, 1999). According to Lim (2008), lean means achieving a balanced use of resources that allows an organization to reduce costs, eliminate waste, and deliver projects on time. In addition, LCI (2013) have emphasized that the goal of lean is to maximize value and minimize waste by using defined techniques and applying them to new project delivery. Thus, lean construction can be seen as a continuous improvement in the construction process with the goal of reducing waste of resources while increasing the value of the project to the client.

Lean management in construction can be demonstrated by three concepts: flow, transformation, and value. There are also links between concepts in contract management, process management, and value management (Bertelsen & Koskela, 2002). Contract management focuses on customer-supplier relationships by seeking motivation and bonuses rather than compensation and fines. The goal of process management is an efficient and predictable process with a minimum

number of errors, which emphasizes the importance of collaboration between the project team and stakeholders. The most important thing in value management is to ensure that the tasks performed to produce goods and services meet the customer's requirements and the purpose of the project and thus create customer value (Bertelsen & Koskela 2002).

The construction industry has been criticized for weak performance due to its inability to form teams and to work together effectively (Egan, 1998, 2002; Evbuomwan & Anumba, 1998). A construction project is typically a collaborative project involving several different organizations brought together to form a "construction project team" responsible for the design and construction of the project (Alshawi & Faraj, 2002), which has traditionally been a separate activities or phases (Anumba et al., 2002). This is the reason why many of the groups involved work to achieve individually defined objectives, which are often contradicting each other. Success is defined as the achievement of individual organizational indicators rather than the results of collective projects (Cornick & Mather, 1999). As a result, the construction industry has not fully benefited from the increase in productivity and product quality caused by teamwork (Glassop, 2002; Golestani & van Zwanenberg, 1996; Hayes, 2002).

This fragmented approach to a project often results in project teams being characterized by conflicting relationships, a lack of transparency, and mistrust. This, in turn, often leads to a culture of prosecution, with members of different teams striving to minimize their exposure to poor performance rather than working together in a spirit of trust, cooperation, and collaboration. As most construction project teams are made up of participants from different organizations, which come together to form temporary organizations with the aim of achieving a common goal of project implementation (Jefferies & Chen, 1999), the process of integrating existing individual company-specific teams is critical if different teams the construction project must work together effectively. Any strategy or system that brings together different parties in a project, utilizing the common strength of all teams, can contribute to the success of the product delivered by the team (Akintoye et al., 2000; Howell, 1996; Payne et al., 2003).

Collaborative project arrangements have risen to improve project implementation through successful collaboration and integration of different project groups (Ibrahim et al., 2016; Lahdenperä, 2012). Inconsistencies in integration, coordination, and collaboration between project partners have been found to affect poor project performance (Ibrahim et al., 2013), whereas there is a positive relationship between collaboration and project performance (Lloyd-

Walker et al., 2014; Rahman & Kumaraswamy, 2008). Common key integration features in all delivery methods of collaborative projects can be classified as collaborative culture, team building, administrative coherence, commercial unity, design priorities, team work spaces and operating methods (Lahdenperä, 2012).

According to Ballard (2012), stakeholders should evaluate three main principles when approaching project delivery: *integrated organization, aligned commercial interests and lean management.* An integrated organization (i.e., an integrated project team) oversees project implementation and strives to implement the project efficiently by maximizing value to the end-user (Sakal, 2005). The aligned commercial interests of all parties allow funds to move across organizational and contractual boundaries in search of the best project-level investment that may arise through innovation, but may not be realized when the "who pays, who wins" problem arises, which can be resolved by reconciling the commercial interests of the parties (Ballard, 2012). This approach also allows for risk sharing, which is in the interests of both the client and the end-user (Morgan & Liker, 2006; Norrman, 2008; Pekuri et al., 2013). Lean management is like an operating system (Ballard et al., 2014; Thomsen et al., 2010) built to pursue the lean ideal, to adhere to appropriate principles, and to use the best available methods and tools, both management and technological, to apply those principles (Ballard, 2012).

Lean construction refers to the application of Lean principles, methods, and tools to the construction industry (Ballard, 2012; Jørgensen & Emmitt, 2009). Hines et al. (2004) state that at the functional level, the use of any tool is possible if it supports the organization in implementing lean principles that aim to add value to the customer. Thus, the tools and methods represent a more practical aspect of lean, where the focus is often on eliminating waste. However, the use of any particular tool or method must be carefully considered in a business environment because everyone has their own specific needs and lean transformation is a dynamic process that is unique to each organization (Worley & Doolen, 2006). The special needs of different business environments mean that a wide variety of tools and methods have been developed and used for lean implementation. Lean production, lean product development and lean construction can be seen as lean toolkits in their specific environments (Pekuri et al., 2012). Recognized as suitable for construction projects, lean tools can be grouped under five major lean principles: value, value stream, flow, pull, and perfection (Picchi & Granja, 2004), which also follow the basic steps of value stream mapping in lean (Womack & Jones, 1996). Tools such as target value design, value stream mapping and the last planner system support

the construction project and help achieve maximum value for the end-user as efficiently as possible, so the tools can be applied to processes that require human collaboration (Ballard, 2012).

Anyhow, it is notable to taken into consideration that lean with the contractual framework and tools is not the key to succeed to improve one's business. They often fall behind their initial expectations and fail to implement lean philosophy and transform change in their culture if the focus is on tools rather than focusing on people (Bhasin, 2012; Cardon & Bribiescas, 2015; Coetzee et al., 2016; Gao & Low, 2015; Jadhav et al., 2014; Miller at el., 2011; Nordin et al., 2011; Pakidi & Leonard, 2014; Pekuri et al., 2012). There is common understanding (e.g. Marksberry, 2011; Ohno, 1998) on the topic, respect for people (RFP), emphasizing the RFP principles are the key in implementing and making the lean management system work. However, this is not widely understood if the implementation is focusing mostly on continuous improvements of processes while ignoring or misunderstanding the importance of the RFS (Cardon & Bribiescas, 2015; Emiliani, 2006; Emiliani & Stec, 2005; Taleghani, 2010).

Building trust appears to be crucial in moving towards more collaborative ways of working in the construction industry. According to the results of Pekuri et al.'s (2012), in lean implementation managers should pay attention to; building trust, motivation, ensuring skills and competence, developing and selecting the right people, and providing leadership. The common tool-focused approach is not adequate if the aim is to engage people into continuous improvement and transform change and built a sustainable competitive advantage. It is better to start building trust between individuals and other organizations and ensure that everyone knows what is happening and why (Pekuri et al., 2012). Cotzee et al. (2018) have combined in their systematic literature review the key emerging RFP themes, such as implement teamwork as the foundation of the organization, develop and challenge people, motivate people, develop people as problem-solvers, assess people's safety, remove waste from people's daily tasks, and display peoples capabilities by entrusting them with greater responsibility and authority.

2.3.1 Value creation

Value research has been focused more on value creation than on the concept of value itself (e.g., Ahola et al*.,* 2008; Jørgensen & Emmitt, 2009; Möller & Törrönen 2003; Walter et al., 2001). Regardless of how long the debate and effort to define value has continued, there are two meanings documented by the philosopher

Aristoteles (4th century BC); “use-value” and “exchange value”. Although different theories and research flows have been applied over decades in different contexts to conceptualize “value,” the common premise is to focus on customers and users (Haddadi et al., 2015). While the true value of a goods or service can only be determined by the end customer, it is difficult to even determine the end customer in a construction project (Womack & Jones, 1996). The owner of a building is defined as the customer of the suppliers, but the final customer is the user of the building. Womack and Jones (1996) point out that value only matters when it is expressed in a particular product that meets a customer’s needs at a particular price at a given point in time. While this leads to people working in the building as end-users, the fact that each stakeholder has their own value perception cannot be ignored (Haddadi et al., 2016: Lepak et al., 2007).

As already described in previous chapters, projects can be seen as value-added devices that create value for stakeholders (Morris, 2013). This view emphasizes value creation as a social process (Laursen & Svejvig, 2016) rather than the creation of an end product (Winter et al., 2006). Thus, projects can be considered as networked organizational forms (Hobday, 1998) that are ready to create value through collaboration. Value is created in the development and operation of large systems, including not only technical but also organizational complexity (Davies et al., 2005; Lenfle, 2011; Morris & Hough, 1987; Scott et al., 2011), which causes conflicts with requirements, needs and interest in a dynamic project network between organizations (Hellgren & Dtjernberg, 1995; Morris, 2004; Ruuska et al., 2011). Value itself includes both monetary values and non-monetary income, and therefore value could be defined as the relationship between benefits and sacrifices (Ahola et al., 2008; Barima, 2009; Möller & Törrönen, 2003; Walter et al., 2001). Targeting goals, sacrifices, but also increasing the common benefits of all actors are considered important determinants of value creation in the project network (Ahola et al., 2008).

As stated, different stakeholders in the project have different and sometimes competing interests and views on what is valuable. The difference is due to the unique knowledge, objectives, context, and circumstances that affect how the novelty of value is perceived and evaluated (Lepak, Walter et al., 2001; Ruuska et al., 2011). Value creation in a project depends on the relative amount of value that the target user, whether an individual, organization, or society focused on value creation, subjectively perceives (Lepak et al., 2007). However, perceived value and value creation are the result of collaboration between all stakeholders, and the

success of collaboration between actors contributes to value creation for all stakeholders (Coenen et al., 2012).

The value chains of current construction projects are complex and involve several different stakeholders, so the concept of value plays a key role in construction project deliveries (Barima, 2009). Stakeholders no longer create value alone, so they want to open up the opportunity to participate in value creation together with other stakeholders. According to Pekkanen (2005), value creation requires that the project's stakeholder processes are compatible in order to utilize and benefit from the expertise and resources of all stakeholders. Ramaswamy and Gouillart (2010) have called this situation value co-creation. It is about redefining the process and methods and involving stakeholders in organizations by including them in the value stream and value creation process. In essence, value creation adds a perspective of project stakeholder collaboration and participation to the concept of value creation, while shifting the mindset from the traditional "subsystem delivery" to "co-creating system integrity and experience". Just provoking people to "create value" or "deliver value" is insufficient. It requires systematic processes combined with instinct, leadership, vision, and even a dose of lucky timing. Therefore, Murman and Allen (2002) propose a value creation framework consisting of three steps, such as value identification ("find stakeholder value"), value proposition ("agree to and develop the approach"), and value delivery ("deliver on the promise"). Identifying values is the most important step in which all relevant stakeholders align one or more of their value propositions in order to succeed in creating value. Once the different interests and needs have been identified, the value proposition phase brings them together and forms common goals and objectives for the project. The framework does not neatly follow the sequences and is a more or less iterative process, but all steps should be considered separately.

Traditionally, the emergence of an inter-organizational project network initiates in the project design phase (Helggren & Stjernberg, 1995), but recent research shows that a network starts emerging in the front-end phase a project (Artto et al., 2016; Morris, 2013). This is the stage where value creation is reflected in the definition of goals among project actors (Aaltonen et al., 2015; Edkins et al., 2013; Morris, 2013; Williams & Samset, 2010). Therefore, at this stage, the client and or project management must consider how value creation can be promoted through the emerging networks between project organizations in the front-end phase of a project.

However, value creation depends on how needs are met. There are three main roles in a project whose needs need to be assessed to maximize value creation; the owner (here we refer the owner as the client), the suppliers and the users (Haddadi et al., 2016). Successful projects require owners to focus on the long-term perspective, users to focus on the impact of product use, and suppliers to focus on project deliverables or outputs (Samset, 2003). Users must meet their functional and hedonic values, owners must meet the value of users and they must have profitable/optimal operations, and suppliers must meet the value of users and produce efficient and effective (Haddadi, 2016).

Traditionally, the evaluation of the success or failure of construction projects has been based on the extent to which customer objectives such as cost, time and quality have been achieved (Ward et al., 1991). These three, very traditional, features measure the operational success of a project, but they do not give a true picture of project performance. In addition, the realization of operational goals is only visible at the end of projects and is therefore a "delayed" rather than a "leading" performance indicator (Kagioglou et al., 2001). Each project has its own criteria that must be met and is also intended to be evaluated against the target level of performance. The success of the project depends on the achievement of the project objectives and the satisfaction of the participants, meeting user requirements, meeting the purpose of the owner's project, and client satisfaction with the results of the project (Chan et al., 2002; Muller & Turner, 2010). In addition, Muller and Turner (2010) suggested that measuring success should focus on the following stakeholders and parameters such as: satisfaction with the product/service by end-users, satisfaction by suppliers, project team and other project stakeholders, meeting the overall performance goals of the owner (functionality, budget and timing) and meeting user requirements, fulfilling the owner's purpose of the project and client satisfaction with the project results, reoccurring business with the client and meeting the respondent's self-defined success factor.

2.3.2 Methods and tools for interoperability and team integration

Working as a team in a common workspace is one of the key practices that promotes team unity (Ibrahim et al., 2013) and is one of the factors supporting integration (e.g., Alhava et al., 2015; Fundli & Drevland 2014; Khanzode 2008; Knapp et al., 2014). According to Aapaoja et al. (2013) continuous collaboration and interaction, as well as the resulting cultural change, play a role in the development of team unity. The best-known concept of a common workspace is the Big Room, which provides

a context in which the design of physical space and activities, regulations, and responsibilities is emphasized. Physical space is not important in itself, but it allows employees from different permanent organizations to function within the organization, i.e., in the project, and to allow open interaction between people (Dave et al., 2015). The basis for co-operation and the operation of the Big Room can be considered a rather large and wide range of tools and methods that can be used to promote integration. The tools are used by people to follow a planned process that makes operations more efficient through collaboration. It is management responsibility to set the tools to get people to work with the process. Tools are not an end in themselves or a means to an end, but a mechanism for achieving interoperability (Haapasalo, 2018).

In terms of approach, the application of the lean philosophy requires teamwork, simultaneous work, early involvement and systematization, and continuous development. Visual management, in turn, provides methods that focus on improving interaction and information sharing through a variety of tools. In order to identify the factors that facilitate visual management in the Big Room environment, three main factors must be considered - context, mode of operation and methods of visual management, which continue to lead to interoperability (Haapasalo, 2018). The management of interoperability is emphasized in projects where the number of parties increases or the size or complexity of the project increases. This also means that interoperability is its own process and must have the owner of the process - the body that is directly responsible for planning, organizing, managing people and coordinating and developing all activities during implementation. From the point of view of management, it is essential that the implementation of the process focuses on training and learning (Haapasalo, 2018).

Morgan and Liker (2006) have presented PPT logic as the basis for action development, where the idea is to utilize tools and procedures (T) to get people (P) to follow the process (P). The basic logic of management, in turn, includes four stages of planning, organizing, leading and controlling (Robbins & Coulter, 2018). These, combined with interoperability in a construction project, are achieved by applying tools and methods so that adherence to them “automatically” results in joint action. Through co-operation, motivation and the ability to work towards common goals are achieved, which is further refined into a systematic and agile decision-making ability during the project (Haapasalo, 2018).

The literature highlights many different tools or methods that support and promote the realization of integration. Merikallio and Haapasalo (2009) list more than 20 different tool and methods supporting integration. However, there are

difficulties in introducing and exploiting these methods, as there are many methods and learning and implementing them requires a change in practice. One of the problems is that, as is typical of a construction project, the roles of the different parties at different stages of the project are different, which also requires an understanding of interoperability as a whole process. Haapasalo (2018) has tried to simplify and concretize this so that the aspects of interoperability can be divided into four main categories: Value for money, People management, Business management and Product information and information management (Figure 6). This simplification is justified from the point of view of the implementation of management and interoperability. The aspects of interoperability are in fact interlinked and cannot really be distinguished.

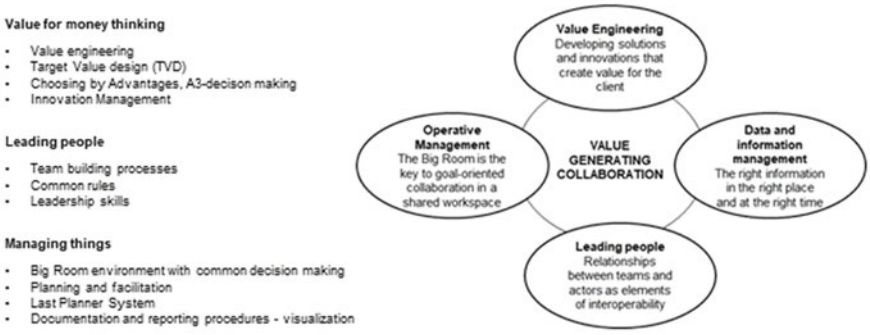

Fig. 6. Aspects of interoperability (Modified from Haapasalo, 2018).

2.4 Collaborative project delivery arrangements

Lean construction lays the foundation for operations based on project delivery systems and is a great way to manage complex, uncertain and unique construction projects (Howell 1999). The term 'project delivery system' has traditionally been used to illustrate the contractual structure of a project. 'Delivery' is understood as a kind of event, and the key question is how the event is constructed. In contrast, in lean construction 'delivery' is understood in terms of the actual work processes used to move a facility from concept to client (Ballard & Zabelle, 2000). Due to challenges and dissatisfied customers - as projects take longer than planned, cost more than expected and the end result does not meet quality expectations - related

to traditional construction projects (Lichtig, 2006) and traditional contracting in complex projects (Lahdenperä, 2012) - have forced the construction industry to look for another project methods (Brady et al., 2006; Brady & Davies, 2011; Davies et al., 2007) and to use both integrated teams and project delivery methods (Brady, 2011; Moore & Dainty, 2001; Walker & Rahamani, 2016) to enhance project value creation and collaboration methods that allow for deeper collaboration methods and early involvement and participation through shared risks, rewards, and goals (Lahdenperä, 2009, 2012; Olander & Landin, 2005; Ross, 2003;).

Three basic forms of collaborative delivery method can be taken as arrangements: integrated project delivery (IPD), project alliancing (PA), and project partnering (Lahdenperä, 2012), which all have common features mentioned above regardless the specific form of delivery. In addition, the common key integration features in all delivery methods can be classified into a culture of collaboration, team building, administrative coherence, commercial unity, planning priorities, team workspaces and operating methods (Lahdenperä, 2012).

Experience with IPDs in complex construction projects has generally been encouraging (Bresnen & Marshall, 2000; Ross, 2003), and good practical results have been obtained from highly collaborative integrated project submission forms (Walker & Lloyd-Walker, 2016). The results provide a concrete frame of reference that provides better-than-normal chances of success in complex and challenging projects with high uncertainty (Lahdenperä, 2017). IPD provides an environment that systematically strengthens collaboration between the project owner, designer, and contractor, so such an environment contributes to finding innovative and value-added solutions to the problems and challenges of complex projects (Aaltonen et al., 2019).

IPD differs slightly from other delivery methods - such as alliance and partnering - by focusing on overall improvement and integrating processes, tools, and people into the system (Azhar et al., 2014). IPD is a highly collaborative process that combines the expertise of project teams from the very beginning of a project. Through a multi-party agreement that specifies the desired means and behaviours, IPD provides contractual support to project teams to align their commercial interests, achieve organizational integration, and adopt a lean management philosophy and methods (e.q. Target Value Design and Last Planner System), and use appropriate technologies that support integrated work and decomposition of silo thinking. An approach in which the project owner, the design team and the contractor make an intellectual and practical contribution at an early

stage of the project has proven to be better than the traditional method of project delivery (Walker & Rahamani, 2016).

It is also recognized that a project that includes a huge amount of knowledge base, technologies and subsystems is in itself challenging and can be defined as complex (Wikström et al., 2010), and very difficult to manage (Davies & Mackenzie, 2014), even to the extent that complexity plays a crucial role in determining whether large projects succeed or fail (Brady & Davies, 2014). Combining multiple perspectives and interests to reach an agreement on project goals and methods to achieve those goals is very challenging (Kujala et al., 2021). On the ideological level, PA and IPD are roughly the same thing, although there are some differences between them in the level of details and the methods and practices have largely been transferred from each other (Lahdenperä, 2012). In the project alliance, there is a standardized process for selecting the project team at once, while in IPD projects, the team members are usually selected separately. From the point of view of integration and cooperation and their formal agreement, PA and IPD are different (Lahdenperä, 2012; Lichtig, 2006).

However, a significant philosophical change has brought with it more integrated and collaborative project delivery methods (Aaltonen et al., 2019), and new perspectives on inter-organizational project management have been required (Wikström et al., 2010). Thus, front-end management of complex projects by identifying appropriate project acquisition is essential (Walker & Lloyd-Walker, 2016). What all this means in the management of integration in the collaboration between the organizations involved in the project is not the focus of this study.

2.4.1 Stakeholder early involvement

Stakeholder early involvement and integration has been identified as one of the most promising solutions to the typical problems of construction projects in general (Aapaoja, Haapasalo, & Söderström, 2013; Baiden et al., 2006; Lahdenperä, 2012). According to Ballard (2008) IPD and PA can be seen as business models based specifically on stakeholder early involvement and integration, where client, customers, contractors, and other stakeholders work together as an integrated, collaborative team. As a whole, early involvement enables benefits like key stakeholder competence and contribution of project plans, knowledge about the end-user processes, avoiding waste design and construction (designing wrong constructs or services, inadequate communication and documentation, defects in designs, poor constructability, etc.), improved construction productivity, enables

the creation of innovative solutions and finally results in pre-planned actions that are synchronized and performed in later stages (Dowlatshahi, 1998; Halttula et al., 2017; van Valkenburg et al., 2008). Early involvement as a process that lasts throughout the front-end phase, together with integration, can be considered essential for the success of a project in general (Aapaoja, Herrala et al., 2013; Distanont et al., 2012; Henriksen et al., 2006; Olsson et al., 2010). Handfield et al. (1999) emphasized that the more complex a project, the earlier the key stakeholders should be integrated.

As mentioned above, the potential to influence the success of a project is seen as the best in the early stages of a project, as decisions made at an early stage reduce unnecessary changes in later stages of development and even lifecycle costs (Lehto et al., 2011; Möttönen et al., 2009). Several studies (Dowlatshahi, 1998; Valkenburg et al., 2008) suggest that early stakeholder involvement provides at least the following benefits:

- Early involvement reduces the likelihood of developing poor planning.
- Early involvement in the design phase increases the likelihood of a more effective design, better construction operations, and less waste.
- Early knowledge of end-users leads to higher customer satisfaction with the functionality and use of the product.
- The more stakeholders know about the actual use of products by customers or end-users, the more effectively stakeholders act to meet the needs and intentions of the buyer.
- The more stakeholders know the exact objectives of the design specifications, the better the stakeholders will be able to meet or revise the specifications by adapting their capabilities.
- Early involvement provides space for creative solutions and intensive exchange of ideas.
- Early involvement leads to actions that are synchronized and performed in stages.

2.4.2 User involvement

The emergence of the concept of stakeholders and the intrusion of user involvement in the design, planning and evaluation of the built environment, have confused the customer's identity and relationship with the construction industry. It has attracted attention in the scientific world and in the industry for a long time (Newcombe,

2003; Richardson & Connelly, 2005). The concept of 'users' seems problematic, partly because it is a term that is not constantly used by industry players, and partly because the heterogeneity of a group only becomes apparent when these players begin to wonder who users really are or could be (Eriksson et al., 2015). Although the term 'user' seems to refer to a single person or well-defined group of people, it is complex and broad, and encompasses many different groups with different and often conflicting values and needs (Bertelsen & Emmitt, 2005; Jensen, 2006). Therefore, users involved in the design process should represent the best possible end-user groups so that designers understand their real needs (Kujala & Kauppinen, 2004). Despite the possibility of user involvement to bring varying and conflicting requirements to the project, the Kujala and Kauppinen's (2004) research showed that in most cases it is possible to identify a key set of common requirements because user needs vary little. Therefore, during the design process, broader user needs can be met. However, the authors point out that it is important to identify and consider additional and conflicting requirements at an early stage in the process.

The term 'involvement' is general and covers several levels of participation (Arnstein, 1969; Kujala, 2003, Wulz, 1986), each representing a relationship between users and service providers with different levels of power (Baggott, 2005). In addition, there is no clear definition of user involvement. It has been used synonymously with "focus on users" (Wilson et al., 1997), "consulting end-users" (Noyes et al., 1996), and "participation of users" (Heinbokel et al., 1996). User involvement can be seen as a general term that describes direct contact with users and covers many approaches. According to Damodaran (1996), broad characterization can include all of these levels of user involvement, with three forms of participation: informative, consultative, and participatory. In the informative form, users only provide and receive information, which is a lower level of involvement. Consulting is an intermediate level where users can comment on a predefined service or range of services. The third, participatory form, is a higher level of involvement and gives users influence over system-wide decisions.

The importance of the user involvement is acknowledged also in hospital projects. The design of healthcare buildings is complex due to a number of factors related to the quality and requirements of the facilities and the need to improve the delivery of care services (Caixeta & Fabricio, 2012; Tzortzopoulos et al., 2009). Insufficient exploration of opportunities by focusing on structural issues instead of exploring future concepts integrated into user needs can lead to a poor outcome (Elf et al., 2012; Elf & Malmqvist, 2009). Several studies have shown the importance of early user involvement in the healthcare design process - aligned in order to

enable new way of working - so that designers understand how service activities are performed (Damodaran, 1996; Henriksen et al., 2006; Jensen, 2011; Kujala, 2003; Olsson et al., 2010; Tzortzopoulos et al., 2009) and how its impact on hospital design (Damodaran, 1996; Jensen, 2011; Kujala, 2003). Furthermore, participatory approaches in early design, when changes are more feasible, can assist designers in capturing real needs of end-users (Damodaran, 1996; Jensen, 2011; Kujala, 2003).

It is important that designers fully understand the client values, which in part come from end-users' requirements, in order to ensure high achievement of client expectations or to avoid significant changes during the design process, which can bring frustration among designers and increase project costs (Thyssen et al., 2010). Therefore, participatory approaches may align design and the preferences and needs of current and potential users (Andrade et al., 2012). Especially at the early stages of the healthcare design process, when changes are more feasible, the involvement of users as 'experts on their own experiences' (Visser et al., 2005), can bring important information about the use of the building, and be crucial to identify appropriately the users' needs, expectations, preferences and requirements, which are often evolving, and ensure high-quality performance in activities in the future building (Sfandyarifard & Tzortzopoulos, 2011; Steen et al., 2007; Stern et al., 2003). Participatory design still contributes to legitimize and justify decisions, which may also avoid later disagreements with the design outcomes (Olsson et al., 2010).

Despite the benefits, there are at least two risks to user involvement: the first is the loss of control over designers due to the involvement of different people. The second refers to the increasing complexity of the project due to the need to manage different objectives and interests, which requires further coordination efforts (Hoyer et al., 2010; Steen et al., 2011). According to Damodaran (1996), participation usually brings great rewards despite high resources and process management through user involvement.

In order to gain an in-depth understanding of the benefits and difficulties of user involvement in the design process of healthcare construction professionals need conversational skills (Luck, 2007a), and deeper forms, visualization tools and methods of user involvement (Capjon, 2004; Luck, 2007b), and competencies and knowledge in relation to service design disciplines (Magnusson et al., 2003), which is not in the case in this dissertation.

2.4.3 Stakeholder integration

In modern construction, management interest has increasingly shifted towards teams, because they can transcend the efforts of individuals acting alone, especially when performance requires multiple skills and expert judgment (Hayes, 2002; Scarnati, 2001). It can even be argued that teamwork is not an option, it is a prerequisite for the successful delivery of construction projects (Salas et al., 2017; Stewart & Barrick, 2000). In fact, the general view is that teams are expected to produce better results than the average number of individuals (Katzenbach & Smith, 1993; Wheelan, 2016). Usually, construction project teams work together to develop only one project and therefore rarely work together on more than one project (Anumba et al., 2007; Senaratne & Gunawardane, 2015; Senaratne & Hapuarachchi, 2009). This, of course, brings its own challenges because of the prevailing short-term perspective of construction to succeed in integrating the parties into a team and operating effectively (Forgues & Koskela, 2009; Sumner et al., 1999). Indeed, integration is recognized as an ongoing process aimed at improving team culture and professional attitudes during the integration process and the project (Dainty et al., 2001; Howell, 1996). Bringing together individuals and organizations with diverse knowledge and skills creates a culture of effective and productive collaboration to improve construction outcomes (Anumba et al., 2002; Owen et al., 2010).

Project team integration means bringing together different disciplines or organizations with different goals, needs and cultures into one cohesive and mutually supportive unit (Baiden et al., 2006; Fischer, 1989), where processes and cultures are coordinated through collaboration (Ochieng & Price, 2009). There may be problems with the performance of projects in integrated groups, which are quite often related to the context, but quite rarely to the process itself, i.e. they are not technical but more socio-cognitive (Baiden et al., 2003; Forgues & Koskela, 2009; Moore & Dainty, 1999). In construction, where design and construction are treated more as a technical process to solve technical problems and teamwork is not just a social process, the design outcome is also limited to the cognitive skills and limitations of individual engineers. The design process has recommended to treat as a combination of technical, cognitive, and social processes (Cross & Clayburn Cross, 1995).

Team integration (Egan, 2002) in construction industry is often connected to collaborative practices (Ibrahim et al., 2015), methods and behaviours that promote an environment where information and interaction among team members is freely

exchanged and team mutually support each other (Ibrahim et al., 2011). This has enabled both the integration (Ibrahim et al., 2015; Walker & Lloyd-Walker, 2015; Walker & Rahamani, 2016) and more positive, co-operative and collaborative teamwork, which improves efficiency and performance in the project (Baiden & Price, 2011; Egan, 2002). However, it is good to know that cooperation agreements and contractual incentives and methods and tools alone do not directly affect the better outcome of a project. The effect on better performance comes indirectly from improved interpersonal relationships and the quality of teamwork (Suprapto et al., 2016). However, project agreements between organizations have an impact on project coordination through goal setting, implementation, and limitation of agreements (Oliveira & Lumineau, 2017). The support, trust and trust-based operating arrangements of the top management have been identified as the main factors contributing to the relationship agreement (Rahman & Kumaraswamy, 2008).

Baiden et al. (2003) have defined an integrated team as

> a team of individually distinct groups or teams with functional identities working together in a consciously complementary and continuous way to achieve a set objective or target through a system of unrestricted cross-sharing of information leading to more efficient and effective decision making under competent team leadership with the ability drive the overall optimum achievement of initial goals set for the team. (p. 235)

The team must therefore have all the necessary skills, management and dynamism needed to achieve the desired goal of the team. As defined above, an integrated project team could be a group of groups or individuals with defined skills and professional roles working together to achieve a common goal set for a project over a period of time. The level of independence makes working together a prerequisite for success. To achieve a common goal, they must also share information and make optimal analytical and informed decisions (Baiden et al., 2003).

Baiden et al. (2006) have compiled from several studies some common features, which have been identified that a project team needs to fulfil in order to call themselves a "fully integrated team", such as; common goals and focus for the project, completely free of organizational boundaries, shared risks and benefits, flexible member composition ready to respond to changes, work in a mutual place, no restrictions on sharing information, atmosphere must be fair and respectful with "no blame" culture. Baiden et al. (2006) have also suggested that integration can be described as the adoption of working methods, and behaviours that create a

culture of effective and efficient collaboration between individuals and organizations. In summary, the success of teams depends on how well they can integrate (Ibrahim et al., 2013).

2.5 The front-end of the project

Given that the project identification phase is a very critical and the most important stage in the project life cycle in securing project success (Flyvbjerg, 2013) and for project management (e.g. Shiferaw et al., 2012), there is a general disagreement about the terms used by project management researchers to refer to this phase, but there is a consensus within the evidence that the early stages of a project are the stage at which the strategic success or failure of a project is defined (Edkins & Smith, 2012; Samset & Volden, 2016; Williams et al., 2019). The importance and need to invest in this phase in particular stems from the fact that critical decisions are made at this stage (Kock et al., 2015). Several researchers call it as the strategic pre-project phase (e.g., Aaltonen et al., 2015; Edkins et al., 2013; Morris, 2013; Williams & Samset, 2010), the output of which is the concept plan for that project (Olsson & Samset, 2006), where goals and project definition are the most important value-creating elements (Edkins et al., 2013; Flyvbjerg, 2013; Morris, 2013). In this phase there is also a great opportunity to impact on project outcomes, because improving project definition reduces the number of implementation phase changes (Barsho & Harries-Rees, 2003). Collins et al. (2017) have analyzed that project with a better-defined scope had significantly better cost and schedule performance than projects with a less defined scope, and argue that front-end planning is potentially the most effective activity in managing construction projects. In this study, we refer this phase as the front-end of the project, which typically begins with the presentation of a project idea and ends with the final decision on project funding and implementation (Samset & Volden, 2016).

Project management plays a key role in the front-end phase. It contributes to the strategic and long-term success of projects (Edkins et al., 2013 ; Flyvbjerg, 2013; Miller & Hobbs, 2005 ; Samset & Volden, 2016; Shiferaw, Klakegg, & Haavaldsen, 2012), especially in terms of critical decision-making (Kock et al., 2015), but this is still not sufficiently understood (Baccarini, 1999; Edkins et al., 2013; Merrow, 2011; Morris, 2013; Tzortzopoulos et al., 2006; Williams et al., 2019). Thus it provides a valid reason to highlight it in this study. In general, the organization that wants to achieve a particular change or outcome is the one that manages the front-end. Typically this is outside the scope of normal project management in the

implementation phase, although project management should be involved in some way (Williams et al., 2019). However, it does not matter much whether it is a 'permanent' or a 'temporary' organization that explore the front-end. Rather, it is important to create a perspective on the project, to get to know the context of the project and the socio-political status of the project. Williams et al. (2019) emphasize the importance of the project proposal and its content, where the project must be justified and its feasibility taken into consideration. The focus is on defining the needs of the permanent organization, the customer's goals, and above all, the nature of the most critical stakeholders and the concept and organization or structure implementing the project, which are in fact important decisions to be made at the front-end stage (Williams et al., 2019). Although stakeholder management and its dynamics are the basic factors for front-end management, it is not well understood at the front-end stage (Aaltonen et al., 2015). Therefore, the role of project stakeholders and their influential behavior are very important in understanding early-stage dynamics and goal-setting processes in multi-enterprise projects that bring together multiple companies and other organizations (Aaltonen et al., 2015). Depending on the dynamics and positions of the stakeholders, stakeholder management and engagement are important ways for project managers to address stakeholder issues in the front-end (Aaltonen et al., 2015) and generally (Olander & Landin, 2005; Savage et al., 1991).

The importance of the front-end phase of hospital construction projects, where the most critical strategical decisions (Elf et al., 2015) are made, has also been widely recognized (Williams et al., 2019; Williams & Samset, 2010). A hospital project where duality is both a construction project and an organizational change project (Fréchette et al., 2020; Gordon & Pollack, 2018) requires hospital projects to combine different skills, knowledge, and project perspectives. Managing such integration in the front-end phase especially where uncertainty is high and information is scarce, places demand on project participants at both the individual and organizational levels. Cooperation between inter-organizations involves both risks and complexity, and there are high failure rates (Bygballe & Swärd, 2019; Gulati et al., 2012). Efforts should be made to overcome these challenges in early project phases (Saukko et al., 2020).

Strategic success in large public projects is said to continue to be achieved by choosing the right concept (Klakegg & Haavaldsen, 2011; Samset & Christensen, 2017). Therefore, several solutions (or concepts) for a defined need should be developed in the front-end to ensure that all major solutions are considered (Samset & Christensen, 2017). This emphasizes the importance of evaluations and the

development of reliable concepts that meet identified needs (Samset, 2010; Klakegg, 2010). The relationship between superior goals and project development is seen as a challenge to project strategy. This challenge needs to be addressed properly for the project to succeed (Morris, 2009). Therefore, it is important to evaluate different concepts by looking at the project from different perspectives, using multiple approaches and tools (Samset, 2014; Volden & Samset, 2013). Understanding that looking at a project in ways other than the usual implementation perspective is vital in front-end design (Larssen et al., 2020). For example the role of the client in complex projects is no longer remote than in the traditional projects, but has evolved to promote integration, coordination and innovation through stakeholder engagement, and the client is responsible for defining the organization of the system and coordinating multiple parties at different stages of the project (Denicol et al., 2021). Clarification of the roles between the different partners in a project is essential at the beginning of the project in order to avoid the late establishment and commitment of the rest of the organization, which is a major source of problems in the complex implementation of the project (Denicol, 2020).

2.6 Synthesis of the literature review

This literature review provides a foundation for exploring ways to enhance value creation in a collaborative hospital construction project through early stakeholder involvement and integration, which also highlights the relationships and interactions between the concepts presented in this study. Early involvement and integration are enabled by a collaborative delivery concept, such as IPD, and the application of interoperability tools and methods to enable team integration and value co-creation in the project. The concepts of a stakeholder landscape and stakeholder management, integrated project teams, and the front end form a whole that can be used to define both the client's goals and the requirements and needs of the end-users, as well as the interests of the project stakeholder at the beginning of the project. In this way, Lean's ideas and philosophy are put into practice by maximizing value and minimizing waste.

The literature shows that the foundation for successful value creation is laid at the front-end stage of a project. The benefits of investing time and effort in planning and implementing the front-end process underlying value creation stand out, especially in complex project environments, such as a hospital construction project. A systematic stakeholder management process formed by analyzing the project stakeholders and stakeholder landscape provides insight through which the client

can identify the resources, skills, and most appropriate project implementation method with the capabilities needed to implement the project and achieve the project objectives.

In general, a systematic stakeholder management process led by project management at the beginning of a project covers the identification, classification, and management of stakeholders. However, not all project stakeholders are equal, and they cannot be treated in the same way. One way to analyze project stakeholders is to assess the salience of the identified stakeholders in relation to the project's purposes, requirements, and constraints. In other words, the project stakeholders, whether internal or external, are those who express the needs and requirements of the project and can thus make a significant contribution to the project and ensure value creation. Therefore, it is necessary to discuss how multiple stakeholders with conflicting interests can be identified, analyzed, and managed. Usually, these processes begin after a project implementation decision, with a partly unclear definition of objectives and a vague picture of the project's stakeholder landscape during the project lifecycle. Depending on the project environment and complexity, projects differ, so they cannot be implemented and managed in the same way. One way to analyze a project environment is to evaluate the landscape analysis of the project.

Collaborative project delivery methods, such as IPD, provide a platform that enhances early involvement and team integration. The benefits of early involvement are particularly evident when stakeholders work as an integrated team, as synergies can be achieved by leveraging stakeholder expertise, and interfaces between organizations are important sources of innovation if interactions are managed wisely. In addition, the early identification of both client goals and project partners, along with end-user needs and requirements, reduces unnecessary changes and conflicts of interest during subsequent development phases and even total lifecycle costs. However, making full use of stakeholder expertise and knowledge requires project management to systematically identify and involve key project stakeholders at the beginning of a project. To succeed in integration, project management can apply specific Lean tools and procedures to get people to follow the value creation process, as the success of the process defines the result.

A concept of collaboration, referred to here as a collaborative project delivery method, is related to early involvement and integration. It explores how to enhance value creation in collaborative environments by incorporating early involvement and integration into an environment in which the complexity of the project results from the different and conflicting requirements of several organizations

participating in a dynamic, inter-organizational project network. There are several different definitions of delivery arrangements for relational projects in the current construction literature, so this research mainly looks at the collaborative nature of the models and the involvement of project stakeholders in the early stages of the project. Team integration is usually associated with collaborative work practices, tools, and disciplines that create an environment in which communication and interaction between team members are free and the team members support each other. Therefore, integration requires that the project team work together to achieve the goals and objectives of the project through communication and interaction, in which case, different organizational cultures must be aligned.

In addition to the collaborative practices, tools, and methods mentioned above, this study examines in the previous literature the different tools and methods (e.g., the target value design, last planner system, the Big Room, and Smartsheet™ as an information platform) for implementing an effective project and how they are reflected in what tools should be used, how tools are selected, and how the main areas of the project should be covered without sacrificing unnecessary resources on tools and methods.

This study examines the significance of the front-end phase of a project, where the front-end directs the relationship of the project toward the co-generation of value and value is achieved through collaboration, so that launching the project requires concrete action or action-driven entrepreneurship at the front-end. The client's role in the front-end phase of complex projects has evolved to promote integration, coordination, and innovation through early stakeholder involvement and integration. In addition, the client is the key in complex project delivery, responsible for determining the organization of the system and coordinating multiple parties at different stages of the project. Clarifying the roles of project participants is essential at the beginning of a project to avoid the late establishment and commitment of the rest of the organization, which is a major source of problems in complex project delivery. Despite these assumptions, we are not yet familiar with how management actions or clients' front-end activities create value or what those actions should be. Therefore, in this literature review section, we discuss the importance of the client's role in the planning and management of front-end activities, which provides both a theoretical—albeit still limited—perspective on value creation and a view of management based on empirical data presenting practical management implications in Section 3.

Overall, this chapter provides an overview of the literature and discussions within the scope of this study. This chapter reviews the literature and existing

research to explain the content and purpose of this research to readers. However, to keep the study as clear and consistent as possible, some aspects of the literature have been omitted from the discussion because they are not considered relevant.

As a synthesis, the literature review has led to the understanding that *value creation in a hospital construction project begins in the front-end phase of the project by involving and integrating all relevant stakeholders to adapt their value propositions and align them with common goals and objectives as well as to define and develop an approach to value creation.* If we look more closely at the previous sentence, it is the sum of many concepts and discussions. First, establishing the stakeholder landscape and background of the healthcare process—its goals, strategic objectives, and structures, together with the hospital construction project stakeholder landscape, and especially the needs and requirements of the end-users—is the most essential task to identify and analyze in the front-end phase, when the project is not yet even established. Based on the identified goals, objectives, and requirements, the necessary skills, knowledge, capability, and resources to be sought can be defined along with the project implementation concept for successful value creation. Collaborative project delivery is recognized as an efficient and productive way to implement complex projects, such as a hospital project, achieve client-set goals, and meet end-user requirements and satisfaction, not to mention satisfying the objectives of the project participants through early involvement and integration. To succeed in enhancing team integration and collaboration among project partners, applicable lean tools and methods assist people in following the value-creation process. Tools are not ends in themselves or means to an end but mechanisms for achieving interoperability and improving the "focus on people" thinking. Finally, the client plays an important role in the front-end phase.

At the very beginning, the client must first define the goals to be set for the project, which are derived from the client's strategic goals. To achieve the goals of a project to be set up, it is important to identify the project's operating environment and the main stakeholders involved in the project, as well as their needs, requirements, and expectations, which must be presented, analyzed, documented, and validated. Based on the analysis of the operating environment and the goals of the various stakeholders, the necessary resources, competence needs, and abilities can be determined, as well as the project implementation method and project management principles with which the project can be successfully implemented. The more complex a project is, the likelier it is to have a collaborative implementation model in which skilled and capable partners are acquired at the

earliest possible stage and the parties are jointly involved in project design and implementation, creating a framework for integrating organizations and know-how to maximize project value creation. However, an integrated project team cannot be formed if stakeholders are not systematically identified, analyzed, and managed on a project-by-project basis. Hospital projects should also consider at the earliest possible stage how and by what methods end-users can be involved in both value definition and value creation—at the beginning of the project and throughout the project life cycle. The tasks described above and the required outputs should be defined by the client on a project-by-project basis already at the front-end stage, and the described process should be planned and managed until the project implementation organization is formed.

In summary, this research has led to the understanding that the client's relevant activities at the front end of the project provide the foundation for the value-creation process and the tools that support project management to succeed in achieving the goals set by the client. Table 7 summarizes the most essential concepts behind stakeholder management: the stakeholder landscape, early involvement, integration, Lean tools and methods, and the front-end phase in construction.

Table 7. Main discussions and concepts of this dissertation.

Topic	Key concepts for enhancing value creation in the front-end phase of a project	Main references
Stakeholder approach	Stakeholder concept	Aaltonen, 2010; Cleland, 1986; Freeman, 1984; Mitchell et al., 1997
	Stakeholder management	Aaltonen, 2010; Bourne & Walker, 2005; Cova & Salle, 2005; Eskerod & Jepsen, 2013; Olander & Landin, 2005; Walker et al., 2008
	Stakeholder salience	Aapaoja & Haapasalo, 2014; Aaltonen & Kujala, 2010; Aaltonen & Kujala, 2016;
	Stakeholder landscape	Aaltonen et al., 2008, 2015
Collaborative project delivery arrangement	Integrated project delivery	Lahdenperä, 2012; Walker et al., 2017
	Early stakeholder involvement	Aapaoja, Haapasalo, & Söderström, 2013
	Stakeholder integration	Baiden et al., 2006; Lahdenperä, 2012; Ragatz et al., 1997; Baiden & Price, 2011; Egan, 2002; Ibrahim et al., 2015; Walker & Lloyd-Walker, 2015; Walker & Rahamani, 2016

Topic	Key concepts for enhancing value creation in the front-end phase of a project	Main references
Lean approach	Lean construction	Ballard et al., 2001; Jorgensen & Emmit, 2009; Koskela, 2000; Koskela et al., 2002; Womach & Jones, 1996;
	Value creation	Ahola et al., 2008; Bertelsen & Koskela, 2002; Walter et al., 2001
	Lean tools and methods	Ballard, 2000; Ballard & Zabelle, 2000; Morgan & Liker, 2006; Parrish & Tommelein, 2009; Pennanen & Ballard, 2011
Project identification and the strategic pre-project phase	The front-end	Edkins et al., 2013; Samset & Volden, 2016; Williams & Samset, 2010, 2012; Williams et al., 2009

3 Research contribution

This chapter presents the research contributions of the original studies. Sections 3.1–3.4 answer the research questions presented in the introduction (Table 2), and the results are synthesized in Section 3.5. The research is based on a hospital project that demonstrates duality as both a construction project and an organizational change project. The implementation of this project was divided into two construction sub-projects in which a collaborative contract model was used (the alliance model).

3.1 Stakeholder landscape in healthcare process

Article I explores the existing stakeholder landscape in the regional healthcare process and answers the RQ1. This study presents empirical evidence of the stakeholder landscape in healthcare process at regional level, based on an analysis in one of the Finnish hospital districts. The study identifies the importance of identifying and analyzing four different areas of landscape - complexity (both number and relationship), uncertainty, dynamism and institutional context - that allow stakeholder relationships to be described from fundamental perspectives. In case of complex permanent processes in the background of a temporary construction project this study underlines the importance of analyzing the landscape also in the process level. In the study it became evident that the Finnish national healthcare system is currently operating in a complex, turbulent and strongly institutional environment. Table 8 illustrates in detail the conceptual framework for the stakeholder landscape of the healthcare process at regional level and its key features.

Table 8. Findings on the regional stakeholder landscape (Adapted, with permission, from Article I © 2022 Authors).

Landscape elements	Landscape characteristics
Complexity	Stakeholder element complexity
	Multiple stakeholders in collaboration both in national and regional healthcare on different levels and positions to use their legitimacy.
	Regulators, authorities, owners (29 municipalities), other hospital districts, other university hospitals, other hospitals and health centres in the region.
	Stakeholder relationship complexity
	Interrelationships within and between stakeholders and conflicting goals and requirements.

Landscape elements	Landscape characteristics
	New coalitions emerge regularly and all the stakeholders are not seen as equal in all respects.
Uncertainty	Stakeholders are largely unknown and it is difficult to get information and define the goals and requirements from identified stakeholders. Differences and contradictions in the goals and requirements of the stakeholders and there are very conflicting perceptions of overall requirements among stakeholders. Policy environment, context of issues, stakeholder interests, positions, coalitions and influence are subject to change, and stakeholder perceptions of the past also change. The political context of policymaking is frequently unstable and can be subject to sudden, unexpected transformations.
Dynamism	New stakeholder entities have emerged and joined into the healthcare process and there will be new significant stakeholders in the future and the importance of stakeholders will increase, and their positions will change accordingly. Significant changes in stakeholders and their interrelationships are anticipated as both the project and the legislation (SHCR) progress, which affect to the stakeholder landscape accordingly. Once stakeholders are under political election, there will be changes in their goals and opinions.
Institutional context	Collaboration containing multifunctional and multidisciplinary actors both in public, private and third sector, including media without any legitimacy position but using their urgency. Stakeholders have significant, direct and personal relationships with 'local actors'—such as universities and colleges, municipal decision-makers, and senior officials. Stakeholders are on different levels and positions based on their institutional position.

The biggest challenges are the multi-level governance model and the fact that there are numerous stakeholders (individuals and communities in local and national level) who sometimes have conflicting needs, interests, requirements and goals, as well as the potential and/or interest to influence. An important practical benefit of a stakeholder landscape description is that it shows the complexity and challenges in real processes and the real salience of stakeholders, which typically differ from the formal understanding of the governance model. It is full of uncertainty and dynamism, with a multiplicity of stakeholders, with their own interests, perspectives and priorities, in the background. Demands from the government viewpoint and expectations from the patients'/taxpayers' viewpoint differ and may change rapidly and substantially. The public, patients and specific-interest groups are more sophisticated and have higher expectations of healthcare services.

Overall, the above table presents a summary of the stakeholder landscape analysis of our healthcare process case study; complexity (both numbers and

relationships), uncertainty, dynamism, and institutional context, which all pose challenges for the management. The study examines how the complexity, multifunctionality and multidisciplinary of healthcare have created a challenging environment to plan, organize and manage healthcare processes. The complexity of decision-making is caused by the large number of stakeholders with conflicting goals and requirements, so a practical stakeholder map and analysis combined with a stakeholder landscape offer great potential for healthcare management. When analysing the regional healthcare process, it became evident that all the landscape elements - complexity, uncertainty, dynamism and institutional context - can be difficult to organise and manage. Even the actors in the process were not fully aware of who the stakeholders were and what roles they played. This creates an unfair position for the managers to make successful decisions (both at the strategic and operative levels) in the long run. Multiplicity can be found, and is very high, in every element of the landscape (Table 8).

In addition to the permanent healthcare process level stakeholder landscape elements the table 9 present the summary of the managerial implications of the stakeholder landscape analysis, especially in decision-making in the management of healthcare processes. An analysis of the empirical results shows how complexity (both numbers and relationships), uncertainty, dynamism, and institutional context pose challenges to management.

Table 9. Impacts of stakeholder landscape elements on value creation (Adapted, with permission, from Article I © 2022 Authors).

Landscape elements	Impacts into stakeholder management
Complexity *Stakeholder element complexity*	A high degree of element and relationship complexity may increase the level of dynamism, which in turn, increase the degree of complexity. Thus, it becomes more challenging to balance between stakeholders' claims, which then may increase the probability of conflicts.
Stakeholder relationship complexity	The most powerful and contractually important stakeholders and those with influence to achieve or prevent objectives to be identified in the early phase. Not forgetting to identify the marginal stakeholders so that they do not become key non-supportive stakeholders who confront the organisation with undesired discontinuations. Proactively develop the relationships between and among the stakeholders rather than concentrate only on effectively dealing with a particular stakeholder on a specific issue—satisfy key stakeholders by offering appropriate inducements in exchange for essential contributions.

Landscape elements	Impacts into stakeholder management
Uncertainty	Identify and analyse the requirements and expectations of the various stakeholders that they have set and identify potential challenges, risks and problems that could prevent the achievement of common goals, and develop a plan of action. Identify the degree of legitimacy, power and urgency with respect to various stakeholders to avoid lack of influence, collaboration and misunderstanding of each stakeholder (individual or group) responsibilities during the process, where the degree of salience may vary.
Dynamism	While the degree of dynamism increases, it may increase the probability of forming coalitions with other stakeholders, and it may decrease the analysability of the stakeholder landscape and may increase the degree of uncertainty. Describe the value chain of the healthcare process and its different stages. Further identify at which stage each stakeholder who is significantly influencing the process and is critical for success has the main need for contribution and the opportunity to contribute, and at what stage something need to be prepared and decided. Identify interdependencies between different stakeholders and ensure consistency of objectives and needs, and communicate goals clearly, maintain transparency, and actively report on results to all stakeholders.
Institutional context	Identify the main institutional stakeholders and their objectives and requirements for cooperation—contractual and regulatory. Identify potential—internal, interface and external—stakeholders who may be interested in building a coalition—and why—what goal they want to achieve.

The landscape analysis highlighted the implications of practical management, which must be taken into account naturally in day-to-day business, but especially i.e. in investing in a new hospital, which usually consists of both developing new and more efficient care processes and building new facilities. Given the complexity and high level of uncertainty in the healthcare process, identifying all key stakeholders, their interests, needs, goals, and expectations is essential for successful valuation at both the strategy and hospital building project levels as early phase as possible. The analysed stakeholder landscape and environment - even if it is preliminary - will facilitate the classification of the hospital construction project based on its importance and complexity and begin to assess the impact on stakeholder leadership, engagement, and overall project strategy.

The most consistent theme of the analysis was to examine how stakeholder landscape analysis could be applied to the management of healthcare processes. In particular, what challenges the operating environment could pose for the design and implementation of a hospital construction project, mainly involving collaboration

and decision making by applying the analysis at the level of healthcare projects to clarify the complexity, multifunctionality and multidisciplinary to improve project success in the future. This notion provided the basis for setting RQ2. We also consider that there is evident potential to utilize stakeholder landscaping, as well as its social and healthcare development and management elements (planning, organizing and implementing), to achieve more efficient and effective results. The method applied in this study can be seen as an important contribution to healthcare process management.

3.2 Stakeholder landscape in a hospital project

Article II examines the stakeholder landscape of a hospital construction project and describes its management implications for value creation and answers RQ2. This study is direct continuation for Article I. Although stakeholder management has attracted growing interest in project management research, it is still used relatively modestly in healthcare projects. Project stakeholder management has been extensively and qualitatively studied (Cleland, 1986; Eskerod et al., 2015), but it appears that previous research has focused on the development of conceptual tools, traditional techniques, and theoretical frameworks for analyzing the characteristics of individual stakeholders and the dyadic relationships between a project and its stakeholders (e.g. Bourne & Walker, 2005; Olander & Landin, 2005; Winch, 2004), and recently also on stakeholder management strategy (Aaltonen et al., 2008; Beringer et al., 2013). Clearly, a more holistic approach is needed to analyze and understand the nature of different stakeholder landscapes and environments, their key characteristics, key dimensions, and management impacts (Aaltonen & Kujala, 2016). For this reason, this study seeks to describe what kind of stakeholder landscape exists in the healthcare process at the regional level and to assess the resulting management impacts both at the process level and at the hospital construction project.

When analyzing the stakeholder landscape at the hospital building project level, it became clear that all elements of the landscape - complexity, uncertainty, dynamism, and institutional context - occur and demonstrate how the hospital construction project operates in a strong institutional, complex, and turbulent environment (Table 10). As previous research has shown the hospital and related organization form a fundamentally vague and complex social system (Begun et al., 2003; Larsen et al., 2021; Wilson & Holt, 2001; Zimmerman, 2010), where changes are challenging to introduce (Aubry et al., 2014). Thus hospital construction

projects are complex socio-technical systems where it is challenging task of integrating heterogeneous actors to develop both new facilities and bringing about an organizational change for a healthcare organization.

Table 10. Findings in the project stakeholder landscape (Adapted under CC BY 4.0 license from Article II © 2022 Authors).

Landscape elements	Impacts into stakeholder management
Complexity	*Stakeholder element complexity* Collaboration between the several stakeholders is multifunctional and multidisciplinary. Due to the number of alliance partners, there are different project management procedures and tools, and stakeholders are on different levels and positions to use their legitimacy *Stakeholder relationship complexity* The goals and requirements of stakeholders are conflicting and cause challenges. New coalitions emerge regularly, and all the stakeholders are not seen as equal in all respects due to their status in the Alliance Agreement.
Uncertainty	Difficulties to receive information on stakeholders' goals and requirements and there are clear differences and contradictions in the goals of the stakeholders. There are very conflicting perceptions of end-user's requirements and needs within stakeholders and among end-users, which changes all the time . Policy environment, context of issues, stakeholder interests, positions, coalitions and influence are subject to change, and stakeholder perceptions of the past also change. The political context of policymaking is frequently nonstable and can be subject to sudden, unexpected transformations.
Dynamism	New stakeholders have emerged and joined the project, and new stakeholders will emerge as the organisational change is implemented and the importance of stakeholders will increase, and their positions will change during the project. The on going national wide reform change the stakeholder landscape when the ownership and the responsibilities among the stakeholder's change. Once some of the stakeholders are under political election, there are also changes in stakeholder goals and opinions
Institutional context	The operating environment has different institutional organisations, values, norms and routines in the implementation of projects. Stakeholders are on different levels and positions based on their institutional position. There might appear coalitions among groups of trustees and medical staff, and among alliance partners.

This study portrayed how the service providers (as architects, engineers and contractors) selected for the project, as well as the management and end-user group representatives in the client organization, were unaware of the stakeholders involved and already involved in the project, their interdependencies and their influence to set and achieve project objectives. The project is largely supported by internal stakeholders mainly due to their contractual relationship with the client, and the other stakeholders may be for, against or indifferent depending on how their needs and requirements are considered. The service providers belonging to the alliance considered the client as the most important stakeholders, who appears to them as one stakeholder. The reality is, however, that in practice, the client organization is a broad entity that includes both the client's project management organization (PMO) and the end-user groups, which consists of maintenance and medical stuff (physicians and nurses). The importance of end-user groups has been emphasized, especially during the implementation phase, when the final space and technical solutions as well as user requirements are implemented.

The initial requirements of the end-user in the initial data of the development phase have changed and developed accordingly during the implementation phase, which in turn has caused significant cost and schedule pressures in relation to the commonly agreed targets. The main reasons have been that end-user requirements have not been defined at the front-end stage of the project until the project's target budget has been defined and that end-user groups have changed during the project, bringing in new stakeholders, new experience, and some better information of new ways of working. The above situation illustrates that the operational objectives and financial framework of the project, as well as the roles, responsibilities, and authorities of the various parties, have not been sufficiently defined and communicated between the parties, whether covered by the Alliance Agreement. End-users in hospital construction projects are the stakeholder who ultimately assesses whether the project objectives have been successful and whether they are satisfied with the outcome.

In addition to the features of the stakeholder landscape of the hospital construction project described above, the separate phases of the collaborative project must also be considered. While stakeholder goals and interests may vary and change during a project, there must be a certain process that requires defining certain management roles at different stages of the project in order to succeed in value definition and value creation. We further derived implications for value creation (Table 11) from the analysis of the stakeholder landscape. These features need to be carefully understood at different stages of the project life cycle.

Table 11. Impacts of landscape elements on value creation (Adapted under CC BY 4.0 license from Article II © 2022 Authors).

Implication	Description
Preparation phase	
Main objectives and constraints set by the client for the project	The main objectives and project constraints must be defined at the early phase of the project. They must be further developed with the client's project management team as concrete and precise so that they can be measured in terms of value.
Strategy of acquisition for the project	Complexity, uncertainty, dynamism and institutional context have clear effects on suitable project implementation model. Intentional decision for choosing the right project delivery model depends on the project's characteristics, unforeseen factors, and the client's needs, preferences and capabilities.
Identification of the most important stakeholders and their ability to contribute	The complexity of the project should be analysed regarding the number of stakeholders, their expectations and interests alongside their source of power to influence in the project.
The client's role in a project and governance model	The client clarifies their own role and defines their own organisation for the project – as experts or in management. The job descriptions to each project management members, responsibilities and ability to make decisions should be defined to avoid ambiguities during the project life cycle.
Development and Planning phase	
Setting objectives at the strategy level (intended impact and client value proposition), setting requirements at the end-user level (expected use-value) and at the project level (time, cost and quality).	Communicate and develop the intended strategic outcome with the supplier's delivery team. This should be done through a supplier value proposition at the procurement stage. The response expressed in the supplier's offer should be a description of how the output of the project is targeted and how it is believed to be achieved following the client's priorities (client value proposition) and end-user (expected value in use) requirements as it has been set in preparation phase. The business case (Project Implementation Plan) to be aligned with the client's strategy, the goals to be clarified and communicated clearly with all the most important stakeholders and the project governance to be established.
Value identification – identifying value creating elements (value for money criteria) for all design concepts	To effectively create value (to be defined: what is valuable to each party?). This is necessary for creating ideas for how to fulfil the needs and strategies. The nature of the intended value needs to be clear and transparent for the parties involved.

Implication	Description
	Design a value management process to synergise the project team, the client and end-users. This participation is especially a requirement for life-cycle thinking in project development.
Functional description for how to secure value creation in the project.	Project internal procedures to design and deliver the planned values with the client's vision and goals, alongside the end-user requirements. The project's business model is developed following the client's defined needs and intended user effect.
Stakeholder identification and engagement. Involving all major stakeholders.	Internal procedures to ensure that the delivered project will follow the client's vision and goals, alongside the end-user requirements, notifying all stakeholders – internal, interface and external stakeholders.
Define and commit on processes, tools, and measurement with main stakeholders for the project	Combine the project implementation plan with the business strategy and establish internal procedures for the project. For example, involvement and innovation processes, requirement management, target value design, choosing by advantages, decision-making procedure (stage-gate approval process) and validation, change management, key performance areas and targets, risk management.
Communication plan	Establish communication plan for dissemination, visibility and transparency.
Construction/Implementation phase	
Project Governance	Clear decision-making and problem-solving processes during the project.
Condition of Satisfaction	Identify and monitor critical success factors (CSF) for achieving common goals among different stakeholders; these factors include cost, time and quality. Compare the target level against the performance level for the success of the project.
Communication plan	Clear decision-making and problem-solving processes during the project with a stakeholder power/interest matrix.
Monitoring, controlling and evaluation of the project	Schedule control –jointly agree on intermediate milestones. Costs control – focus on tracking the money spent – value analysis system. Quality control – ensuring the project reach the designed level of quality. A systematic evaluation of the value creation and achievement of the objectives.

It became evident that these features above have a clear impact on the planning of the hospital and thus on management of the project, from the project preparation phase - as the front-end - to both the development phase, which defines objectives and requirements, and to the implementation phase, where objectives and

requirements must be met. The diversity of these features and the range of different stakeholders increase the need to understand the unique aspects of a hospital project, which in this context is recognised as a complex system. The multidimensionality due to the complexity of the project strongly impacts the entire hospital project.

As a general management impact of a hospital design and construction project, the data from this study support that project managers should begin to assess the impact of different types of landscapes on the management of both stakeholders and projects before embarking on an in-depth stakeholder analysis. In the early stages of the project, when the objectives, processes, execution plans and resources - time, budget, and organisation - need to be defined, the framework developed for the stakeholder landscape could be useful. This notion provided the basis for setting RQ3.

3.3 Client's pertinent activities in the front-end phase

Article III explores the concept of the front-end phase of a project and identifies the pertinent management activities of the client in the front-end phase to succeed in value definition in a hospital construction project and answers RQ3. Empirical findings of this study resonate with previous research on different methods for collaboration, where the front-end, and early involvement and integration of stakeholders have been recognized important, where the aim is to create the knowledge pool that can be used to maximize project's value creation (cf. Aapaoja et al., 2013; Hietajärvi et al., 2017a).

The study provides an overview of what is a front-end concept that appears to be conceptually existing, not as a very specifically defined process among project management practitioners. Although there is no precise and widely used definition of the front-end, its importance and criticality for the success of the project is widely acknowledged. In practice, research could serve as a concept for both project implementers and project developers, who are able - and in fact responsible - to plan and organize the front-end phase, allowing for early involvement and integration, which enhance preconditions for creating value in the project. Our findings show that the front-end phase in collaborative contract models consists of two sub-phases, *value definition* and *value proposition* (e.g. Murman and Allen, 2002), where the client has several essential responsibilities and activities, and above all a crucial role for *early involvement and integration.* This study depicts and validates seven managerial propositions (Figure 7), from which five (project objectives and value definition, stakeholder identification and management, project

organization and governance including decision making process, required competences, and communication strategy) focused on value definition of the front-end phase. Remaining two propositions (collaboration tools and methods and user needs/requirement management) were issued in the procurement phase (*as a value proposition phase),* however, delivering the benefit maybe later.

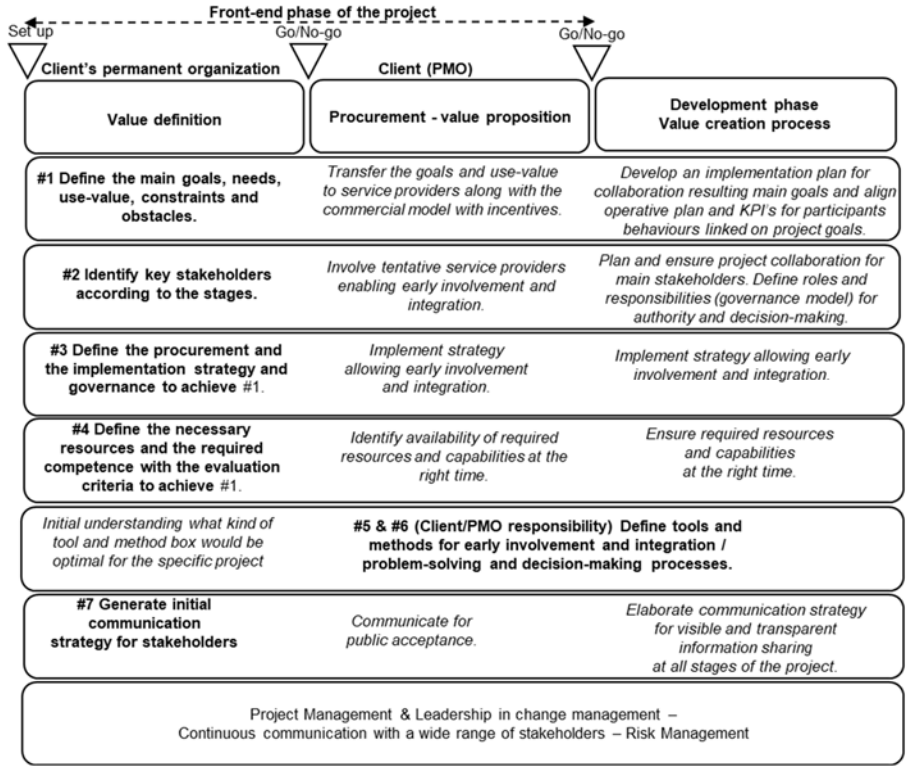

Fig. 7. Elements of client organizing early involvement and integration in the project front-end of a hospital project (Modified from Article III).

Our findings elaborate the previous general understanding why specifically early involvement and integration needs to take place as described in detail client organizations' pertinent stakeholder integration roles and activities in the early front-end phase of hospital construction projects, offering new, contextual understanding. Interestingly, a transition happens after the first sub-phase as client transforms from permanent to temporary organization, e.g. Project Management

Office (PMO). Concurrently, the responsibilities and activities of the client change as well as seen in Figure 7. In this latter sub-phase, the client's temporary agent (PMO) defines tools and methods for early stakeholder involvement and integration based on the activities of the first sub-phase. The purpose is to transform the value definition toward a more concrete value proposition for the project. This notion - collaboration tools and methods – provided the basis for setting RQ4.

3.4 Organizing methods enabling integration

Article IV explores the key elements and methods for enhancing integration and collaborative value creation in a complex hospital project and answers RQ4. Previous research has highlighted the importance of stakeholder integration and collaboration in the success of project results. There is also a wealth of literature on a variety of lean tools and methods that promote early involvement and integration in the implementation of an effective project. The critical principle presented by Morgan and Liker (2006) to utilize tools and procedures (T) is to get people (P) to follow the process (P), as the success of the process defines the result. However, there is very little research on what kind of tools should be used, how the tools are selected, and how the main areas of the project management are covered without sacrificing resources on tools and methods unnecessarily, when the key issue is to promote "focus on people" thinking.

The empirical findings of this study resonate with previous studies on a variety of lean tools and methods that enhance collaboration and value creation in construction projects. As previous studies have already shown, due to several separate project participants and the many different management tools and methods, and the challenge of their introduction, which require a huge effort to change people's behavior, it is therefore necessary to invest in understanding collaboration as a process. The aim of this study was not only to find specific tools that produce a particular result, but, on the contrary, to find out whether the tools have indirect effects that promote early participation and integration into the team, which in turn could increase people's motivation and innovation to give their best for the project.

In this study the collaboration as a process was simplified by dividing it into four main disciplines: (1) value engineering, (2) leading people, (3) operative management of the process and (4) data and information management. Each discipline utilized a tool and / or a method that promotes both direct and indirect effects to enhance early involvement and team integration, and quid people to focus on goals. Based on our practical findings from the case project, the utilized tools

and methods have been very beneficial. Basically, all the applied methods resulted their promises in their primary integration and collaboration areas but also enabled other indirect benefits (Table 12). For example, TVD makes people commit to common goals and collaborate more intensively than in traditional ways. Through the LPS scheduling, planning and managing the implementation, the actors 'necessarily' cooperate and consider the actions of other parties. Big Room as a method allows collaborative work and activities. It provides a context in which the design of physical space and activities, the rules of the project and the areas of responsibility are emphasized. Physical space allows for open interaction between people. However, working in a common space alone in itself increases collaboration and efficiency, unless activities are planned and managed.

Leading people - emphasized here as "focus on people" - is perhaps the most demanding and challenging part of integration and collaboration. For example, jointly agreed methods and tools guide people to pursue common goals and focus on the essentials. Creating common rules should be combined with team integration, so that people also focus on the essentials of the various activities in the project. Data and information management is naturally critical in any project. In a complex project, it should be planned before the project, and there should be dedicated sub-processes to clarify the operations creating a spirit of trust, resulting in commitment from the beginning and enabling quality data and information. In this study, e.g. Smartsheet™ provided a framework for open data exchange and real-time snapshot creation.

Table 12. Challenges and experiences of applied methods in a complex hospital construction project (Article IV).

Challenges/ experiences	TVD	LPS	Big Room	Smartsheet™
Direct deliverable	Setting objectives and allowable costs of the project and guiding design to develop cost-effective solution to meet the goals and needs of end-users.	Concretise the timetable objectives with their milestones and identify obstacles and interdependencies between the different parties, and take action plans and designate those responsible.	Creates an excellent framework for open and direct communication, and for rapid problem solving and innovation.	A common platform and information sharing system creates an excellent framework for open and direct communication, and better information management and timely decision making.

Challenges/ experiences	TVD	LPS	Big Room	Smartsheet™
Indirect result	Forcing people to innovate new solutions. Collaborative design harnesses the expertise of the different parties in the project (innovation and value for money).	Reduces uncertainty and improves communication between project parties. Resourcing. The right people in the right place, at the right time. Increase trust between the parties.	Effective team integration and effective and confidential atmosphere for the project. Improve the team spirit.	Helps in team integration when information is shared openly with everyone, while also improves mutual trust.
Main challenge	Understanding the TVD process - in the same way. The challenge is to get the right people, to the right place at the right time.	Training and orientation have been challenging, as has facilitation and management. Changing the old traditional way of thinking “this has always been done before”.	Getting the right people to the place at the right time. Inefficient use of time and waste of resources if Big Room operations are not managed.	Deployment guidance and training in the use of the tool received too little attention. The challenge is to make different parties understand why to use this tool.
Main benefits	Concretisation of objectives and requirements. The process takes into account the relationship between quality and cost in the right way. The end result is created by working together; all parties are involved from start to finish.	Improves the planning of your own work and the allocation of resources. Identify interdependencies between different tasks. Facilitates problem solving.	Big Room with rules and tools, creates an effective framework, which improves communication and decision-making, interaction and team spirit.	The roles and responsibilities have been described through the management of tasks. The information is in one place and can be visualized e.g. real-time snapshot. A tool for managing large numbers of decisions, changes and tasks, which creates systematicity.

As mentioned above, managing people is key to succeed in project team integration and successfully achieve the goals of the client and the other project participants. However, project management cannot be done only by leading people. Our four layered integration and collaboration disciplines (value engineering, operative management of the process, leading people and data and information management)

proved a valid classification for tools and methods (Figure 8). Practical discussions and some of the literature repeat the 'focus on people' aspect, but how this is done typically remains unanswered.

According to this study, 'focus on people' can be achieved through tools and methods if applied in planned and intentionally managed processes. Planning, organizing, leading and controlling standardized processes; jointly agreed practices and tools; creating a common mindset; getting the right people at the right time; and continuous development and effective management of the Big Room are ways to get people to follow the process (PPT). When following the process, the project team creates an environment for themselves to succeed in achieving the goals and expectations set by the owner and to create value for the project participants.

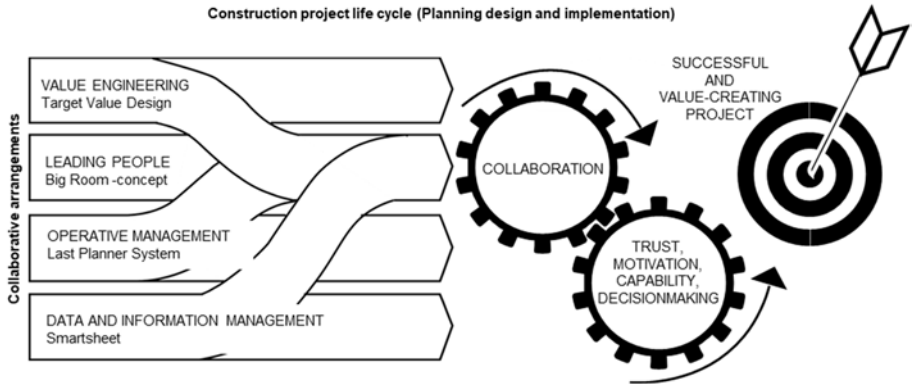

Fig. 8. Organizing different methods enabling integration in complex projects - how different tools impact collaborative value creation (Adapted under CC BY 4.0 license from Article IV © 2022 Authors).

According to our study, each tool resulted in achieving direct goals and deliverables but also indirectly resulted in several benefits in terms of leading the people, where the biggest challenges have been. Whatever tools and methods are used, the most important thing is to get the various stakeholders in the project to share and process information openly and commit to schedules and goals. All this makes it possible to achieve interoperability, which improves the motivation, ability and decision-making of project members, which in turn leads to a successful and value-creating project.

3.5 Research contribution synthesis

The main aim of this dissertation is to enhance value creation in a collaborative hospital construction project. In particular, the question is how to "involve and integrate" stakeholders at the front-end "early" and enable a "focus on people" during the project without forgetting the background of the healthcare process and its goals, objectives, and structures. To guide the construction project of such a hospital, one must first analyze the healthcare process environment and its stakeholder landscape and assess the impact of different stakeholder landscapes on both stakeholder management and the project implementation concept. Stakeholder landscape analysis and the identification of key stakeholders should be performed during the project definition phase, which in this study is defined as the front-end phase of the project. At this stage, when analyzing the stakeholders' landscape, there are other critical management implications that need to be applied to ensure early involvement and integration to enhance value creation in a hospital construction project. The research contributions presented in Sections 3.1–3.4 are displayed in Table 13 and summarized in the text below.

First, stakeholder landscape analysis is indeed a suitable and useful method for analyzing the existing environment of the regional healthcare process to identify all relevant stakeholders, as well as challenges and management implications that should be considered in the early phase of a hospital construction project. Stakeholder analysis could be considered on any scale, providing a more comprehensive picture of the project environment. The most consistent theme of the analysis was to examine how stakeholder landscape analysis could be applied to the management of healthcare processes, and in particular, what challenges the operating environment could pose for the design and implementation of a hospital construction project. These challenges mainly involve collaboration and decision-making by applying the analysis at the level of healthcare projects to clarify the complexity, multifunctionality, and multidisciplinary to improve project success in the future. This is addressed and answered through RQ2 and Article II.

Second, this study was followed by an analysis of the stakeholder landscape of a hospital construction project, where one of the greatest opportunities for exploiting the landscape and its features of project management should be considered in the early stages of the project, as the hospital construction project operates in a strong, complex, and turbulent institutional environment. A project such as a hospital has extensive long-term and socio-economically significant impacts; therefore, it is even more critical that these (sometimes contractionary)

needs and requirements are analyzed in a profound sense through the stakeholder landscape. A longitudinal view of stakeholder landscape analysis offered, through dynamisms, the possibility to analyze these changes. The landscape will, of course, change depending on the terrain; that is, the healthcare system and implementation models to implement hospital construction projects will change, and the content analysis will change accordingly.

Third, to determine the value of a project successfully, the relevant activities of the client were identified in the front-end phase of a hospital construction project, which was recognized as the most important and critical phase in hospital construction projects. Hospital projects that demonstrate duality as both construction projects and organizational change projects require a combination of large amounts of different skills, knowledge, stakeholders, resources, and project perspectives. Managing such integration in the front-end phase, especially where uncertainty is high and information is scarce, places demands on project participants at both the individual and organizational levels. Therefore, the clients' role was recognized as important in this phase by providing a new understanding of the client's role during the front-end phase, including detailed responsibilities and activities related to early stakeholder involvement and integration. In addition, the reality is that the client and stakeholder views on value are often misunderstood. It is, therefore, important that there is an efficient delivery process that combines different needs and goals because the relationship between superior goals and project development is seen as a challenge to the project strategy. This challenge needs to be addressed properly for the project to succeed. Therefore, it is important to evaluate different concepts by looking at the project from different perspectives. Understanding that the project is viewed in ways other than the usual implementation perspective is vital in the front-end phase.

Fourth, the tools and methods used in the planned and intentionally managed processes were identified and validated, which increased early involvement and integration with the idea of "focusing on people" and creating added value for the hospital construction project. The tools and methods utilized were recognized as very beneficial. Basically, all the applied methods fulfilled their promises in their primary integration and collaboration areas but also enabled other indirect benefits, such as enhancing commitment to common goals and collaboration and co-operating more intensively than in traditional ways. Jointly agreed-upon methods and tools guide people to pursue common goals and focus on the essentials. Creating common rules should be combined with team integration so that people also focus on the essentials of the various activities in the project. According to our

results, a “focus on people” can be achieved through tools and methods if applied in planned and intentionally managed processes. Planning, organizing, leading, and controlling standardized processes, jointly agreeing upon practices and tools, creating a common mindset, getting the right people at the right time, and continuous development and effective management of the Big Room are ways to get people to follow the process. When following the process, the project team creates an environment for itself to succeed in achieving the goals and expectations set by the client and creating value for the project participants.

Table 13. Summary of the results for each research question (Articles I–IV).

Article	Research question	Key findings
I	What are the challenges and implications of the stakeholder analysis and landscape in the healthcare process?	Healthcare systems operate in a complex, turbulent, and strongly institutional environment. Depending on the complexity, uncertainty, dynamism, and the institutional context pose challenges for management.
II	What are the stakeholder management challenges and their implications for value creation in a hospital project?	Hospitals operate in a complex and turbulent environment with a multitude of challenges due to the accelerating pace of development in the fields of medicine, nursing, and healthcare technology. Hospital projects demonstrate duality as both construction projects and organizational change projects.
III	What are the critical management functions of the client in the front-end phase of a hospital project that enable early integration and involvement as well as value creation?	There are two separate but iterative phases—value identification and value creation—that the client needs to plan and manage. Provides seven relevant client management functions for the front-end phase.
IV	What are the key elements and methods of creating integration and collaborative value creation in a complex hospital project?	Identifies interoperability tools and methods and related project practices to enhance collaboration, early involvement, and integration.

Figure 9 presents the synthesis of this dissertation. In sum, the development of healthcare often consists of large public construction projects with a long lifetime expectancy and represents major investments and changes in established welfare systems, making it crucial for both the setting of strategic goals and the success of hospital construction projects. Healthcare projects are characterized by a very complex operating environment and a high degree of uncertainty due to a large number and variety of stakeholders with their own interests, diverging views, and priorities, which may often be in conflict. The accelerating pace of change in medical and technological development makes it challenging to define a project's specific objectives, needs, and requirements.

The importance of identifying and managing stakeholders—both internal and external—and analyzing their needs and requirements in the early stages of a hospital construction project is the starting point for setting goals and determining expected value. Stakeholder landscape analysis is a suitable and useful method to analyze the existing environment of the regional healthcare process and identify

what kind of challenges the operational environment could pose to the planning and implementation of the project.

All of this makes the front-end phase of a project the most crucial in hospital construction projects. In addition, the importance of early stakeholder involvement and integration in the early phase of a project is not sufficiently understood. The purpose of this dissertation is to enhance our understanding of how the pertinent client's managerial activities in the front-end phase and appropriated tools and methods enhance value creation in the context of a collaborative hospital construction project.

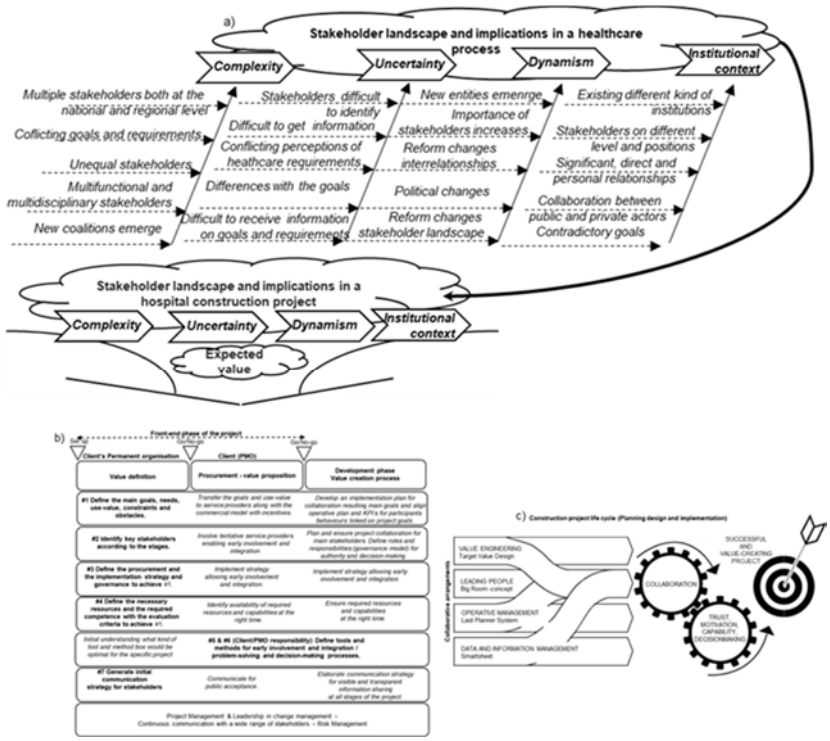

Fig. 9. Elements of enhancing value creation at the front-end of a collaborative hospital construction project; in particular, how to "involve and integrate" stakeholders at the front-end "early" and enable a "focus on people" during the project (Figure 9b modified from Article III; Figure 9c adapted under CC BY 4.0 license from Article IV © 2022 Authors).

4 Discussion

This chapter summarizes the key contributions of this dissertation to the relevant literature. The main theoretical contributions of this study are steps in continuums of the streams of literature focusing on integration in the field of project management, especially in the field of complex construction management, by examining key areas for enhanced collaboration: the stakeholder approach, implementation of collaborative projects, early involvement and integration, the front-end phase of a construction project, and interoperability tools and methods.

This dissertation provides new insight into the applicability of stakeholder approaches, and in particular, stakeholder landscape analysis and the applicability of collaborative delivery methods, including integration tools and methods, and, mainly, the importance of the front-end phase of a hospital construction project. This study also revealed that hospital construction projects do not have systematic integration management or systematic front-end management processes in which key stakeholders—end-users—should be involved as early as possible but are only loosely integrated, if at all. For this reason, there is an urgent need to develop a theory that improves practice in the early integration of project stakeholders and in the planning and management of front-end management activities, especially in hospital construction projects.

In this study, the front-end phase has been identified as one of the key elements, or more specifically, the concept is emphasized of enhancing value creation by enabling early stakeholder involvement and integration into a hospital construction project. The academic literature seems to take the view that stakeholders in collaborative projects need to be involved as early as possible so that they can collaborate and act in an integrated manner, which is why this dissertation provides the conditions for early participation and integration by providing a new concept for managing the front-end phase of a hospital construction project.

4.1 Theoretical contributions

This dissertation contributes to the project management literature in the field of complex construction management by examining key areas for enhanced collaboration: the stakeholder approach, implementation of collaborative projects, early involvement and integration, interoperability tools and methods, and front-end phase of a construction project.

This thesis highlights the prior knowledge that hospital construction projects are complex socio-technical systems in which clients have the challenging task of integrating heterogeneous actors to both develop new facilities and bring about an organizational change in the healthcare organization (Aubry et al., 2014; Bygballe, 2010; Elf & Malmqvist, 2009; Elf et al., 2012, 2015). From an overall project management point of view, the development of healthcare often consists of large public projects with multiple stakeholders and organizational, leadership, and management issues, which are usually long-term and represent large investments and changes in established welfare systems that have a significant impact (Eeckloo et al., 2007; Ernst & Young, 2016; Frechette et al., 2020; Glouberman & Mintzberg, 2001; Mintzberg & Glouberman, 2001; Samset, 2017; Samset et al., 2014; Snowden & Boone, 2007), making it crucial for both the setting of strategic goals and the success of projects. Hospital projects that demonstrate duality as both a construction project and an organizational change project require a combination of large amount of different skills, knowledge, stakeholders, resources, and project perspectives. The capabilities required to manage hospital projects go beyond traditional project management capabilities and require elements of change management (Bygballe, 2010; Hietajärvi et al., 2017b; Olsson, 2008).

Challenges and traditional contracting in complex projects (Lahdenperä, 2012) have forced the construction industry to look for other project methods (Brady & Davies, 2011; Brady et al., 2006; Davies et al., 2007) and to use both integrated teams and project delivery methods (Brady, 2011; Moore & Dainty, 2001; Walker & Rahamani, 2016) to enhance project value creation and collaboration methods, such as common workspaces and operating methods and tools, that allow for deeper collaboration, early involvement, and participation through shared risks, rewards, and goals (Lahdenperä, 2009; Lahdenperä, 2012; Olander & Landin, 2005; Ross, 2003).

Despite general disagreement over the precise definition of the front-end phase of a project, there is a general consensus on its criticality and importance for project management and project success. It is broadly recognized that the early stages of a project are the stages at which the strategic success or failure of a project is defined (Edkins & Smith, 2012; Williams et al., 2019). Therefore, this dissertation highlights previous research on and knowledge of the importance of the front-end phases of hospital construction projects.

This dissertation contributes theoretically to the discourse on the following issues: *the stakeholder landscape at the healthcare process and hospital*

construction project level, interoperability tools and methods enabling value creation, *and the front-end phase of a hospital construction project.*

The stakeholder landscape in the healthcare process (Table 8): The first original study discussed the nature of the Finnish healthcare system and the types of stakeholder landscape elements that emerge there. The main aim of this original study was to prove the applicability of stakeholder analysis and landscaping. This article clarified the stakeholder landscape elements in the Finnish healthcare process and their management effects. The landscape analysis was assessed using Aaltonen and Kujala's (2016) stakeholder landscape framework, which synthesizes four key dimensions of project stakeholder landscapes: complexity, uncertainty, dynamism, and the institutional context.

The results support the findings of previous studies (e.g., Hudelson et al., 2008; Muntlin et al., 2006) that the Finnish national healthcare system is currently operating in a complex, turbulent, and strongly institutional environment full of uncertainty and dynamism, with a multiplicity of stakeholders holding their own interests, perspectives, and priorities in the background. A variety of national and local stakeholders, and their goals and requirements, seem to differ from each other in their backgrounds as well as their ability and power to influence the healthcare process and its requirements. Demands from the government viewpoint and expectations from the patients'/taxpayers' viewpoints differ and may change rapidly and substantially. The public, patients, and specific interest groups are more sophisticated and have higher expectations of healthcare services (e.g., Blomqvist & Qian, 2017). This rapidly changing healthcare landscape is not just a national issue; indeed, it seems to be a global phenomenon (e.g., Hussain et al., 2015).

The result of this study also suggests that stakeholder landscaping (Aaltonen & Kujala, 2016) is a thorough method that describes the overall nature of the healthcare process. The stakeholder landscape framework provides insights and additional information for understanding stakeholder contexts in the general stakeholder research stream (Fassin, 2008), where the concept of the stakeholder environment is largely ignored. In particular, the dimensions of uncertainty, dynamism, and the institutional context of the framework have been largely underestimated in previous project stakeholder management studies, while much emphasis has been placed on stakeholder characteristics and objectives (e.g., Achterkamp & Vos, 2008; Littau et al., 2010; Mok et al., 2014; Yang et al., 2011).

The framework developed (Aaltonen & Kujala, 2016) contributes to the growing research flow that defines, conceptualizes, synthesizes, and rationalizes complexity and its implications for management (e.g. Bosch-Rekveldt et al., 2011;

Geraldi & Adlbrecht, 2007; Geraldi et al., 2011; Maylor et al., 2008; Vidal & Marle, 2008). Although the framework is in line with many previous observations and studies of the complexity of the project, its distinctive feature is that it focuses strictly on the characteristics of the project's stakeholder landscape.

The stakeholder landscape in a hospital construction project (Table 10): The second original study continues the first by applying landscape analysis (Aaltonen & Kujala, 2016) at the level of healthcare projects to clarify complexity, multifunctionality, and multidisciplinarity to improve project success in the future. By analyzing the stakeholder landscape, actors can classify projects based on their stakeholder environments and begin to assess the impacts of different types of landscapes on stakeholder management and project management in general.

This study revealed how the hospital project operates in a strong institutional, complex, and turbulent environment, as assumed due to the healthcare system-level environment. The hospital itself is essentially a vague and complex social system (e.g. Begun et al., 2003; Plesk & Greenhalgh, 2001; Plesk & Wilson, 2001; Wilson & Holt, 2001; Zimmerman, 2010). The differences between the various stakeholders inside and outside a permanent organization and their goals, requirements, needs, and expectations vary due to their backgrounds, responsibilities, and impacts on the hospital construction project (e.g., Artto et al., 2008; D'Amour et al., 2005; Dunlop & Holosko, 2004; Hudelson et al., 2008; Lockhard-Wood, 2000; Moran et al., 2007; Muntlin et al., 2006). Other features of hospital projects identified in previous studies (e.g., Doulabi & Asnaashari, 2016; Dunlop & Holosko, 2004; Herzlinger, 2006; Langabeer, 2008; Lockhard-Wood, 2000; Olsson & Hansen, 2010; Pauget & Wald, 2013; Petri, 2010) were also described in this study.

Evidently, diverse stakeholders and their goals and interests should be identified at the beginning of a project, with their roles defined (e.g., Ackermann & Cadle et al., 2010; Bunn et al., 2002; Cova & Salle, 2005; Eden, 2011; Belout & Gauvreau, 2004; Brugha & Varvasovsk, 2000; Fassin, 2009; Fowler & Walsh, 1999; Freeman, 1984) therefore, different types of stakeholders may need different strategies (Nguyen et al., 2020).

In other words, e.g., the content of a stakeholder map is not an important contribution in this research, but the method is. Healthcare systems differ nationally. In addition, private, public, and occupational systems may cause differences in stakeholder maps or landscape, but the main utility of a clearer understanding remains clarified. Therefore, this study argues that the findings can be generalized

to theory concerning stakeholder management, landscape, and value creation, at least in hospital projects.

The front-end of a hospital construction project (Table 14): The third original study contributes to the field of early involvement and integration in the front-end phase of a hospital construction project, the importance of which has been emphasized. Our empirical findings resonate with previous research on early stakeholder involvement and integration in the front-end stages of projects with the goal of creating a pool of information that can be used to maximize project value creation (e.g., Aapaoja et al., 2013; Hietajärvi et al., 2017a).

Our findings complement the previous general understanding of why early involvement and integration, in particular, need to take place in the front-end stages of hospital construction projects, providing a new contextual understanding. In terms of early stakeholder involvement, integration has also been identified as one of the most promising solutions to typical problems in construction projects (e.g., Aapaoja & Haapasalo, 2013; Baiden et al., 2006; Lahdenperä, 2012). Early involvement and integration also offer several benefits, all of which can lead to better customer satisfaction and more extensive value creation (see, e.g., Dowlatshahi, 1998; van Valkenburg et al., 2008). Stakeholders need to be integrated to achieve project objectives, enabling innovations and impacts planned by the client (e.g., Aapaoja & Haapasalo, 2014; Hietajärvi et al., 2017a). Handfield et al. (1999) emphasized that the more complex a project is, the sooner stakeholders should be involved. Such statements have been quite common in previous research (cf. Aapaoja & Haapasalo, 2014; Lahdenperä, 2012) and one of the main contributions of this study was to thoroughly describe the pertinent stakeholder activities in the front end concerning what and how early involvement and integration should take place. This study sheds light on the logic and timing of pertinent stakeholder activities in the front-end phase of the client. Several conceptual frameworks have been explored to enhance value creation in step-by-step processes, starting with identifying and defining what are considered value-creating elements based on both the owners' strategies and the users' needs in each project. Thus, this process should start as early as possible in the project. The creation of value can be considered to involve three stages: value identification, proposition, and delivery (Murman & Allen 2002). Therefore, the front-end phase is also divided into separate phases. In essence, the findings complement our previous understanding of the client's role in (hospital) construction projects—especially in the project definition phase—to organize, plan, and manage the front-

end phase, but we also found that collaboration agreement models require new capabilities and resources, especially at the front-end.

Interoperability tools and methods enabling value creation in complex projects (Table 14): The fourth original study theoretically contributes to the field of value creation, and particularly to the identification and application of relevant methods and tools that enable early involvement and team integration to enhance value creation in a hospital construction project.

Our research confirmed that integration should be sought through collaborative methods, which are methods and tools used in the operational activities of projects to enable the parties to work more efficiently and to improve their ability to add value and achieve the project's objectives (e.g., Baiden et al., 2006; Ochieng & Price, 2009; Payne et al., 2003). Our four categories for integration and collaboration (*value engineering, operative management of the process, leading people, and data information management*) proved a valid classification for methods and tools. Selected tools, such as the Target Value Design, Last Planner System, Smartsheet™, and the Big Room work environment, contributed significantly to people's efforts to integrate their skills and resources and to collaborate on and encourage their behaviors by promoting an environment in which information is freely exchanged between individuals and parties. The aspects of interoperability described in this study are, in fact, interlinked and indistinguishable. Leading people is perhaps the most demanding part of all, although the four categories offer different approaches to the involvement, engagement, and integration of people. For example, jointly agreed upon and collaboratively coordinated project rules and processes integrate project participants into teams and guide people to pursue common goals and focus on the essentials (e.g., Baiden et al., 2006; Egan, 2002; Ochieng & Price, 2009; Payne et al., 2003).

Table 14. Theoretical contributions (Articles I–IV).

RQ#	Research question	Theoretical contributions
1	What are the challenges and implications of the stakeholder analysis and landscape in the healthcare process?	The stakeholder analysis and landscaping method improves the description of the overall nature of the project stakeholders and their impact on the project definition. The stakeholder landscape framework provides insights and additional information for understanding stakeholder contexts in the general stakeholder research stream. The healthcare system operates in a complex, turbulent, and strongly institutional environment full of uncertainty, dynamism, and a multiplicity of stakeholders with their own interests, perspectives, and priorities in the background.
2	What are the stakeholder management challenges and their implications for value creation in a hospital project?	The hospital project operates in a strong, complex, and turbulent institutional environment. The roles, backgrounds, and responsibilities of the stakeholders vary greatly and affect project management in different ways. Diverse stakeholders and their goals and interests must be identified at the beginning of the project.
3	What are the critical management functions of the client in the front-end phase of a hospital project that enable early integration and involvement as well as value creation?	The importance of early involvement and integration in the front-end phase of a project. The front-end phase has certain steps that need to be planned according to the project environment. The front end is a kind of iteration process that evolves according to the data flow.
4	What are the key elements and methods for creating integration and collaborative value creation in a complex hospital project?	The results contribute to the field of value creation and show how the application of relevant tools and methods allows for early involvement and team integration. Interoperability tools and methods make a significant contribution to integrating people's skills and resources into collaboration and value creation. Integration should be sought through collaborative methods.

4.2 Practical implications

Despite several completed IPD projects, interest in how early involvement and integration between organizations can be enhanced to create collaboration and value for all involved in the project continues to grow. The idea is to identify how the client could manage and integrate project stakeholders more systematically in the front-end phase of a hospital construction project to improve project results and

client and end-user satisfaction. Research will not only contribute to better project stakeholder management, earlier stakeholder involvement, and integration but will also increase knowledge of the benefits by identifying and investing in early-stage interoperability tools and methods that enhance value creation in hospital construction projects. In ideal situations, this increased knowledge has practical consequences and can therefore improve the situation in practice.

The studied phenomenon itself is topical and important, as hospital construction projects are mainly carried out in very demanding and complex operating environments, which focus not only on the delivery of an individual building but aim to create the framework and conditions for better and more efficient healthcare in the future. Therefore, new approaches also require new types of management methods and skills to succeed in a hospital construction project, which is usually associated with both operational and organizational change projects at the same time.

On a general level, the practical implications of this dissertation are connected to the following issues: the *stakeholder landscape at the healthcare process and hospital construction project level, the front-end phase of a hospital construction project, and interoperability tools and methods enabling value creation.*

The stakeholder landscape in the healthcare process (Table 15): This study examines the overall nature and characteristics of the healthcare process-level environment by highlighting its complexity, which strongly influences the hospital construction project level. Not only does it contribute to a better understanding of using the stakeholder landscape framework to manage the healthcare process more efficiently, but professionals can use it to analyze, evaluate, identify, and classify their projects based on the landscape characteristics of stakeholders (Aaltonen & Kujala, 2016).

This study attempts to offer tools to organize the healthcare process more clearly. This method could be used when planning, e.g., Social and Healthcare reform (SHCR) in Finland by identifying, analyzing, and balancing different stakeholders' needs for the good of the entire healthcare process. Organizations should consider their strategies and operations as they face increasing and potentially conflicting demands and needs from their stakeholders, whether they are individuals or groups.

As a managerial implication from a project-level point of view (e.g., any kind of smaller or bigger project according to SHCR), practitioners should start evaluating what kinds of implications different types of stakeholder landscapes have for managing both stakeholders and projects before they start a thorough

stakeholder analysis. In the early stages of projects, when a clear project definition with the related objectives, processes, execution plans, and resources (time, budget, and organization) need to be defined, the framework developed for stakeholder landscaping could be useful. It should be borne in mind that in reality, stakeholders are interlinked, meaning that the involvement of certain stakeholders and the exclusion of others can affect the relationship between them, which may later lead to changes in the whole stakeholder landscape.

The stakeholder landscape in a hospital construction project (Table 15)*:* This article focused on the applicability of stakeholder analysis and landscape in a hospital project, not on the specific stakeholder map or salience, which are more project-specific. This study clarified that the emphasis on and importance of stakeholder landscape features needs to be carefully analyzed, especially in terms of project management in each project. It became clear that these characteristics have a clear impact on the design of the hospital and thus on the management of the project in the IPD project, both in the development phase, where the client's objectives and end-users' requirements are identified and defined as project objectives, and in the implementation phase, where the objectives and requirements must be met. The diversity of these characteristics and the range of different stakeholders increase the need to understand the unique aspects of a hospital project, which in this context is recognized as a complex system. The multidimensionality due to the complexity of the project has a strong impact on the entire hospital project.

The stakeholder landscape provides a good holistic picture of a hospital construction project and describes the overall nature of the project. In addition, the application of a landscape framework to project analysis provides a starting point for professionals to assess what types of challenges the analysis may pose for the project and what management approaches would be most appropriate, especially in the early, front-end phase of a project, when strategic decisions need to be made about the project's goals, processes, and organization. Preliminary stakeholder landscape assessments at this stage allow for more effective stakeholder management and support managers in making decisions about stakeholder engagement, possible stakeholder landscape modifications, and the overall strategy of a project, although different types of stakeholders may require different strategies. In the early stages of a project, when objectives, processes, implementation plans, and resources—time, budgets, and organization—need to be defined and the different stakeholders and their goals and interests and their roles

need to be identified—preferably in the front-end phase of a project—the stakeholder landscape approach could be useful.

One of the best opportunities for utilizing a stakeholder landscape and its components is large hospital projects, where the landscape can be utilized as a tool to improve the value-creation process. A project such as a hospital has extensive long-term and socio-economically significant impacts; therefore, it is even more critical that sometimes even contractionary needs and requirements are analyzed in a profound sense through the stakeholder landscape. The landscape will, of course, change depending on the terrain, i.e., the healthcare system and implementation models for implementing the hospital building project change, and the content analysis will change accordingly. Therefore, a stakeholder landscape framework should be a method for planning a hospital project, specifying how to identify, analyze, and balance different stakeholder needs for the best of the project. The landscape analysis could be extended to any large-scale megaproject, providing a comprehensive picture and revealing different contextual factors.

The front-end of a hospital construction project (Table 15)*:* By highlighting the importance of the front-end phase and early involvement and integration in a hospital construction project compared to theoretical recommendations from previous studies, this study provides a starting point for improving front-end practices. Based on this research, a project perspective is created in the front-end phase of a project by targeting the project objectives, identifying the skills and resources needed to implement the project, analyzing stakeholder needs, interests, and requirements, developing an implementation concept, and assessing key risks.

The study described and validated seven managerial propositions that enhance the management of early involvement and integration in the front-end phase of a hospital project: (1) project objectives and value definitions, (2) stakeholder identification and management, (3) project organization and governance, including decision-making processes, (4) required competences, (5) communication strategies, (6) collaboration tools and methods, and (7) user needs/requirements management. These propositions describe in more detail what early involvement and integration actually mean and how they can be managed.

First, it is useful to distinguish between the front-end and implementation phases of projects. The front-end phase begins when the original idea is invented and proceeds as a complex and often unpredictable process aimed at generating information, consolidating the views and insights of stakeholders, making the final decision on project implementation, and selecting a particular implementation concept based on the original idea. The findings from this study mainly fall into

two main phases, one that relates to *value definition* and the other to *value creation*, which will be discussed in what follows.

The front-end consists of a *value definition* phase, which also includes a procurement phase in which key stakeholders' early involvement and integration is critical. After the front-end phase, the project's development phase begins, where *value creation* then takes place. In the *value definition* phase, the five most important issues identified—project objectives, value definitions, stakeholder identification and management, project organization, and governance—including decision-making process, required competences, and communication strategies—are defined as precisely and rationally as possible. In addition to the fact that the main definition of the project is part of this phase, the criteria for defining value are also part of this phase. During procurement, service providers must ensure that the client's expectations and needs are understood thoroughly and that they have the necessary skills and resources to achieve the objectives of the project. The main objective of the framework is to enable early involvement and integration of the project team and stakeholders, thus creating the conditions for successful valuation and focusing managerial activities on the most critical issues.

In large public investment projects, such as a hospital construction project, the front-end phase can take years or even decades. A key stakeholder during the front-end phase is the client who tries to make the choice of implementation concept without dialogue with future project participants who might oppose the concept, or end-users, who are the most critical stakeholders in hospital construction projects, particularly by defining the requirements for new operations. The management proposals described in this research were compiled into the client's pertinent stakeholder activities at the front-end phase of the hospital project, enabling early involvement and integration. The project management perspective itself is secondary in the front-end phase of a hospital construction project. Once the decision to continue a project has been made, subsequent decisions during the front-end phase will have less impact on the choice of concept per se but will increasingly focus on issues related to budgeting, planning, and implementation. This framework allows the client, and in particular the project management office (in this case, the client's representative) to plan and organize the front end of the project more clearly and efficiently according to the case, which in optimum situations leads toward enhanced value creation.

The most critical and challenging Issues are related to accurately and concretely defining the project's objectives and identifying project stakeholders, including their values and needs, which are very likely to change due to the

complexity and uncertainty of hospital construction projects, not forgetting the owner's strategy. The problem is not in itself that the goals can change but that the client and other stakeholders have a common understanding of this and a clear approach on how to act when goals change - e.g., a change in management plans. Understanding the strategic goals of the owner and users and transforming them into functional buildings seems to be an essential factor in understanding the true value of the project. The realization of these goals can be assessed primarily when the building is in use. Once the different interests are identified, the value proposition phase brings them together and forms common goals and objectives for the project. Often, the value perspectives of the client and stakeholders are misunderstood in the group process. Therefore, it is important to define the value creation process early in the project to create an efficient delivery process that combines different needs and goals. For this reason, the most critical issues identified as key to early integration were setting goals, as described above, identifying key stakeholders, and defining end-user requirements during the front-end phase of the project as accurately as possible.

Interoperability tools and methods enabling value creation in complex projects (Table 15)*:* The study selected, utilized, and analyzed the challenges and experiences associated with the methods applied in a complex hospital project. Based on the study, the careful selection of fewer tools and methods facilitated better results and increased usability and commitment in terms of the purpose of using those tools. This study explored previous literature to identify the key elements and methods for creating integration and collaborative value creation in a complex hospital project and implementing an effective project. It turned out that there is very little research on what kinds of tools should be used, how the tools are selected, and how the main areas of the project are covered without sacrificing resources on tools and methods. In this study, the selected tools and methods were classified into four disciplines: 1) value engineering (Target Value Design), 2) leading people (the Big Room and Last Planner System), 3) operative management of the process, and 4) data and information management (Smartsheet™). The critical principle presented by Morgan and Liker (2006) to utilize tools and procedures (T) is to get people (P) to follow the process (P), as the success of the process defines the result.

From the practical and managerial points of view, the findings from the case project, tools used, and methods have been very beneficial. All of the applied methods fulfilled their promises in their primary integration and collaboration areas but also enabled other indirect benefits. For example, TVD makes people commit

to common goals and collaborate more intensively than in traditional ways. Through LPS scheduling, or the planning and managing of the implementation, the actors "necessarily" cooperate and consider the actions of other parties. The Big Room as a method allows for collaborative work and activities. It provides a context in which the designs of physical spaces and activities, the rules of the project, and the areas of responsibility are emphasized. Physical space allows for open interaction between people. However, working in a common space alone in itself increases collaboration and efficiency unless activities are unplanned and managed. Data and information management are naturally critical in any project. In a complex project, they should be planned before the project, and there should be dedicated sub-processes to clarify the operations, creating a spirit of trust, resulting in commitment from the beginning, and enabling quality data and information. In this research, Smartsheet™ provided a framework for open data exchange and real-time snapshot creation.

According to this study, a "focus on people" can be achieved through certain methods if applied in planned and intentionally managed processes. Planning, organizing, leading, and controlling standardized processes, jointly agreeing upon practices and tools, creating a common mindset, getting the right people at the right time, and continuous development and effective management of the Big Room are ways to get people to follow a process. When following the process, the project team create an environment for themselves to succeed in achieving the goals and expectations set by the client and creating value for the project participants.

These methods need to be planned before the project and implemented very early in the project. Combined with interoperability in a project that causes "automatic" joint action, they result in leading people. The process of cooperation must therefore be understood above all through PPT logic, where the final goal is collaboration and thus a successful project. Methods and tools are ways to achieve a goal and are not ends in themselves. This highlights the critical importance of choosing, learning, and implementing the right tools and methods—not forgetting that implementation tools and methods require training and learning and continuous coaching, and should not be too many, but enough to enable all four areas of integration and collaboration to be implemented that are critical to the success of the project. Whatever tools and methods are used, the most important thing is to get the various stakeholders in the project to share and process information openly and commit to schedules and goals. All this makes it possible to achieve interoperability, which improves the motivation, ability, and decision-making of project members, which in turn leads to a successful and value-creating project.

Table 15. Practical contributions (Articles I-IV).

RQ#	Research question	Practical contributions
1	What are the challenges and implications of stakeholder analysis and landscape in the healthcare process?	The framework can be used to identify what kinds of implications different types of stakeholder landscapes have for managing both stakeholders and projects before they begin a thorough stakeholder analysis. Stakeholder analysis and landscaping methods improve the description of the overall nature of the project stakeholders and their impact on the project definition.
2	What are the stakeholder management challenges and their implications for value creation in a hospital project?	Hospital projects operate in strong, complex, and turbulent institutional environments. The roles, backgrounds, and responsibilities of stakeholders vary greatly and affect project management in different ways. Diverse stakeholders and their goals and interests should be identified at the beginning of the project.
3	What are the critical management functions of the client in the front-end phase of a hospital project that enable early integration and involvement as well as value creation?	The client has a significant role in planning and managing the front end. Front-end planning requires new capabilities and resources. The front-end phase has certain steps that need to be planned according to the project environment. The front end is a kind of iteration process that evolves according to the data flow.
4	What are the key elements and methods for creating integration and collaborative value creation in a complex hospital project?	Interoperability tools and methods must be defined and introduced in the early phase of the project. Tools and methods make a significant contribution to integrating people's skills and resources into collaboration and value creation. Integration should be sought through collaborative methods to enhance early involvement and value definition.

4.3 Reliability and validity

Like qualitative research in general, this research seeks to understand a particular phenomenon rather than generalize it; therefore, this study can be considered qualitative. In this dissertation, the strategy of the case study was chosen from a wide range of methods used in qualitative research, as the case study allows the phenomenon to be considered in its context but also provides a broad view of the phenomenon. When qualitative research is based on a critical realist philosophy, the evaluation criteria of reliability and validity are applicable (Eriksson & Kovalainen, 2008). According to Brymand and Bell (2003), qualitative research can be viewed from four observational perspectives that offer an understanding of the validity and reliability of the research:

1. Trustworthiness of the achieved results
2. Validity of the results in different environments
3. Repeatability of the observations
4. Impact of the researcher's experience and the overall value of the results

Looking at the trustworthiness of the research results, it can be said that the results correlate with the real world. The case study and research methods used in this study influence the theoretical and practical results in the category of trustworthiness. The results have been influenced by previous literature on the stakeholder landscape, delivery of collaborative projects, front-end phase of the project, and interoperability tools and methods, as well as many other categories examined based on keywords such as Lean construction, Lean tools, user participation, early involvement, and team integration. Thus, the results of previous studies correlate with the real world through the work of the researcher. Several stakeholders in each original study were interviewed for this study, and several people from each stakeholder and community were interviewed. Both the workshops and the interviews were semi-structured, allowing for the freedom to gather additional insights during the interactions between the researcher and the interviewees. These perspectives often explained the content better and opened up several perspectives on the issues at hand. The front end, which is a critical step in a hospital construction project and related management activities and which can be seen and defined in many ways but is best implemented, enhances value creation by integrating separate stakeholders in the early stages of the project to collaborate and therefore has a multidimensional role. To ensure reliability, all interviews and workshops were recorded and transcribed to improve reliability and were stored in

the case study database along with memoranda and data analyses made during the interviews and case-related documents. By standardizing, storing, and transcribing data collection methods and using multiple researchers, the reliability of the study can be increased (Yin, 2009).

The validity of the results in different environments is intentionally based on a study by Brymand and Bell (2003). This study validated the front-end concept and the interoperability tools and methods used in collaboration, involving several people from large construction companies as well as several engineering and architectural firms from different industries based on their extensive experience and knowledge of managing large projects. The stakeholder landscape of the healthcare process was validated by involving the client's executives and owners' representatives. The selection of these companies and entities was intended to validate the results. All the original studies focused on the same hospital construction project.

The criterion for evaluating the reliability of a study is fundamentally repeatability, or the extent to which another researcher can repeat the study and obtain similar results (Eriksson & Kovalainen, 2008; Yin, 2003) at any time (Kirk & Miller, 1986). The emphasis should be on the same case and not on repeating the results of one case by performing another case (Yin, 2014). It is possible to impact repeatability by having well-documented research materials and questioners. However, individuals and groups involved in a study may influence the results because their personal competencies on the topic are different (e.g., Saunders & Pearlson, 2009). The uniqueness of a case project and project business poses challenges to the repeatability of this study, which aims to enable someone else to replicate and obtain similar results (Yin, 2009). It is unlikely that some other researchers could get exactly the same results, as the findings usually reflect the reality at the time of data collection (Saunders et al., 2009). Thus, the repeatability of this research is limited, primarily for the following reasons:

- projects are constantly evolving, and situations and practices thus tend to evolve and change,
- interviews are always unique situations, so the opinions of the interviewees may change over time, even if the same questions are asked, and
- the role of the researcher in the analysis is significant, and the conclusions are more or less the interpretations of the researcher, although the steps of the data analysis can be repeated.

However, the research process could be repeated in different projects, as the issues studied - the stakeholder landscape and so on - are relevant to many projects. In addition, another researcher could use the same research tools and even questions again, albeit in a different project environment.

The research should always be as objective as possible, and the impact of the researcher's own values on the results should be minimized. Nevertheless, qualitative research is usually associated with the meaning of subjectivism, as it is often based on interpretation, especially in cases where interviews are used in data collection (Yin, 2009). Thus, repeating the same study in other projects would probably yield at least slightly different results, but the main findings should be generic.

The role of the "involved researcher" - who has been with the project since its inception - has allowed access to everything related to the case study, but all analyses in this study were based on the results of the workshops and interviews. No possible bias was detected in the data collection because we tried to create a confidential relationship with the participants by ensuring full anonymity for the informants in the interviews or other material collections. The possible interpretation bias of the analysis was eliminated by including external researchers in the project. The interviewees participated on a voluntary basis; they were very interested in the development of their own work and made their contributions completely unsolicited, and even quite "honestly", without any separate encouragement. The identity of the case project as "the smartest hospital in the world" created a very development-oriented team spirit in the project and attracted people to maintain a positive attitude towards research and development activities.

Researchers' interests, experiences, and competencies can challenge the objectivity of qualitative research (e.g., Yin, 2003). This can happen more often in the context of semi-structured interviews and workshops. In this study, when the researcher played a key development role in the case project, acted as an "involved researcher," and was part of the data collection, the interviewees were instructed to provide complete and in-depth answers to the research questions and not leave out anything the researcher may have needed to add. In addition, the researcher did his best to remain as objective as possible during the analysis. To ensure this objectivity, the additional authors acted as "outside researchers" (Walsham, 2006). A certain subjectivity was related to the research results in Article IV to some extent, but especially in Article III, which represented a constructive philosophical approach and was based on inductive reasoning. Although the inductive logic of Article III follows an established line of reasoning (Gioia et al., 2013), there is a possibility

that other researchers may interpret the data differently. Original research that is more critical and realistic, especially Articles I and II, contains some subjectivity but at a more moderate level.

The epistemological foundation for the research emerged mainly from interpretivism, employing a qualitative research method, such as case studies, to understand social behaviors, forces, and structures, arguing that knowledge is built around social constructs instead of objective statements about the real world of positivism (cf. Gupta & Awasthy, 2015). However, complete objectivity cannot be achieved in qualitative studies because researchers are not separate from the phenomenon under study, as in this study, and the values and interests of the people involved eventually become part of the research process. We have utilized the experiences of people as data that are inherently context-bound and subjective rather than objective. This research has focused on theory-building rather than theory-testing, which is typical for qualitative research providing a contextual instead of hard and quantitative understanding (Gupta & Awasthy, 2015). The main author of all original studies played an important role in the project, and this person responsible for the real project had access to confidential information in the project; thus, it is possible that this could also have influenced the interpretations. However, this interference has been counteracted by external researchers' analyses of the material in the original study. In addition, an effort has been made to describe the research material in such a way that the logic for drawing conclusions and their content can be found in the research material.

4.4 Recommendations for further research

Although research and inquiry have both theoretical and practical implications, their scale, scope, and boundaries are always limited, so there are several opportunities for further research and expansion of the research. This research focuses on the importance and benefits of early involvement and integration, the aim of which is to enhance value creation in a hospital construction project. This dissertation correlates with previous early involvement and integration research but provides new insights into the key management functions and roles needed to enable early integration and enhance value creation in a hospital construction project in which the stakeholder landscape plays a significant role. As a research context, both the front end, which has been recognized in several studies as the most critical phase of the project's success, and the stakeholder landscape analysis in the project offer several possibilities for further research. This study has a grasp

of those topics, and there certainly is room for further input. Although the research contributes both theoretically and practically, and the research themes discussed here have significant potential for further research, other interesting research perspectives and theoretical perspectives could also be utilized to deepen our knowledge of the front-end phase of the project and the stakeholder landscape framework.

As the front-end of a project is a critical phase in the definition and success of a project and can help increase the early involvement and integration of stakeholders, further research could focus on examining the impact of the client's pertinent management activities if applied systematically. In addition, monitoring the development of team integration during the project by applying interoperability tools and methods to enhance collaboration in several projects would be worth studying. In particular, the tools and methods chosen for the project should guide people to follow a commonly agreed-upon process to achieve the project's goals and affect people's behavior and motivation to work as a team.

The stakeholder landscape framework itself does not measure or form anything concrete for the project and/or stakeholder management that relates to the key dimensions of the framework (complexity, uncertainty, dynamism, and the institutional context). Therefore, it might be worth exploring whether the different stakeholder landscape profiles offer something important at the front-end of the project, identifying the project stakeholders and defining the project concept. Future research should also include more detail on what and how to utilize stakeholder analysis and landscapes in practical decision-making. Moreover, further research could operationalize the concepts of stakeholder analysis and landscape research for quantitative examinations. The stakeholder landscape analysis process could also be extended to any large-scale megaproject, providing a comprehensive picture and revealing different contextual factors.

This study showed that many more competences and resources are required from the client organization, especially at the front-end of the project. In this dissertation, the depicted managerial propositions were compiled into clients' pertinent stakeholder activities at the front-end of a hospital project, enabling early involvement and integration. This dissertation argues that the developed framework enables the client, and the PMO in particular, to organize the front-end of the project more clearly and effectively than one who is not very familiar with the client's goals and objectives and the stakeholder landscape and environment in general. In the long run, collaborative projects are relatively new contract models, and this study should be seen as leading the way to comparative studies in the future.

Both subsequent studies and the capability to run collaborative projects will modify proposed clients' pertinent managerial activities at the front end of a project because the study of the front end is based on one case implemented with the ADR approach. Therefore, it naturally needs verification in several similar, but also different, types of hospitals along with other large projects. Naturally, one must be careful when generalizing the findings to different contexts.

The current empirical evidence on the performance of collaborative delivery models and their ability to add value to the client and all other stakeholders is limited. Although some things are known about budgets and schedule performance, more evidence is needed on the effectiveness and impact of these delivery models on value creation (e.g., value management) and long-term customer benefits to improve current practices. In particular, it would be useful to examine how the effects and benefits of the correct and efficient use of TVD at the front end of the project, when the client sets objectives, budgets, and constraints, have helped to set the final goals and objectives and made it easier to challenge the wishes and needs of customers, how they are achieved, and whether they create value.

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