Designing a feedback tool to improve stakeholder collaborations in shipbuilding projects

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Laurea University of Applied Sciences **Abstract**
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Over the last few decades, the cruise shipbuilding industry has experienced a surge in growth and innovation relative to both the scale and complexity of new build projects. The design and construction of modern cruise ships brings together a vast network of multidisciplinary organizations which must effectively collaborate to complete these massive projects. The study and development project of this thesis was commissioned by the company ShipPalette Oy to pinpoint areas for improvement within the shipbuilding process. The aim of this thesis is to identify the most typical challenges and consequences of those challenges related to stakeholder collaboration during the architectural design phase. The purpose of this thesis is to design a tool to be used as a starting point template for feedback processes between stakeholders to improve the architectural design process in a new build project.

This thesis derives the theoretical framework from the study of systems thinking, network theory, organization theory and knowledge sharing. The development project was conducted by following service design processes and methods. Guided by the double diamond process created by the British Design Council, research, interviews, workshops, surveys, and ultimately a feedback tool was developed, prototyped and tested with highly knowledgeable representatives from the main stakeholder groups involved in the architectural design process of a cruise ship new build project.

The results of the development project uncovered a wide range of collaboration challenges affecting all stakeholder groups in the architectural design phase and additionally produced a guideline for challenge topics related to collaboration that should be included in a joint feedback process involving the main stakeholder groups (which is not currently a standardized practice). Using findings from the theoretical framework in addition to survey methodology, a feedback tool in the form of an outlined feedback process and feedback survey template was developed.

This feedback tool was designed to fill a gap in knowledge sharing practices between stakeholders by providing the opportunity for actionable insights to be gathered that can ultimately be used to improve future collaborative processes in the architectural design phase of a new build cruise ship project.
Keywords: Shipbuilding, stakeholder networks, feedback, service design

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1 Introduction

The cruise ship industry has undergone rapid growth in the last few decades with cruise ship construction projects becoming larger and evermore complex. According to the latest Cruise Industry News Report, worldwide there are currently 85 different cruise brands with a total of 375 operational vessels presently in service, and this figure is constantly in flux (Cruise Industry News 2022). The companies around the world that own and operate these different cruise brands are based in many different countries (for example the United States, Australia, Germany, France, Italy, the United Kingdom, and China).

As of 2022, there were 283 operational shipyards across the globe where new ships are constructed (Statista 2023). There are many different types of ships being constructed ranging from military naval ships, to industrial transport vessels such as container and tanker ships, to leisure vessels such as passenger ships and everything in between.

In naval architecture, there are two main types of ships constructed: Merchant Ships and Warships. Cruise ships fall into the category of merchant ships. ***Merchant ships*** are categorized as vessels constructed for the purpose of carrying cargo (human or material) on a specific route. Merchant ships that carry human cargo are categorized as ***passenger ships***. Within the passenger ship category there are ferries, liners, and cruise ships. A ***ferry***, commonly referred to as a roll-on roll-off (Ro-Ro) ship, is designed for short-haul journeys transporting passengers and vehicles (personal and commercial). The name stems from the ability of the ship to have vehicles be loaded by rolling on and off the back of the vessel. A ***liner*** is designed specifically to carry passengers across the ocean between two destinations. A ***cruise ship*** has a slightly different construction than a liner and is designed to transport passengers to many different port destinations on a vessel designed for leisure travel. Cruise ships feature multiple decks with many amenities and activities such as pools, shopping, dining, lounges, theatres, and recreational attractions (Tupper 2013, 379-381).

The size and complexity of these vessels grows larger by the decade. Having recently debuted in January 2022, the world's largest cruise ship is currently the Wonder of the Seas by Royal Caribbean International, which was built at the Chantiers de l'Atlantique shipyard in France. The Wonder of the Seas features 18 decks containing a wide range of amenities such as 21 food venues, 11 bars, a central park at sea, a boardwalk, theatres, rock climbing, multiple pools and waterslides, spas, casinos, a fully functional medical center and more. Measuring 1,188 feet (362 meters) long by 215 feet (65 meters) wide and a massive gross tonnage of 235,600 gross tonnes, this vessel is truly a floating city with a maximum capacity for 7,084 guests and 2,204 crew (Royal Caribbean International 2022).

Launched in January 2020 and built at the Meyer Turku shipyard in Finland, the Mardi Gras, owned by Carnival Cruise Lines, features the world's first roller coaster at sea which measures 800 feet long (243 meters) with speeds up to 40 mph (64 km/h). Launched in 2021 and built at the Fincantieri-Marghera shipyard in Italy, the Norwegian Prima, owned by Norwegian Cruise Lines, features the world's first three deck high go-kart racetrack where guests can reach top speeds of over 30 mph (50 km/h). Great amounts of complexity and detail are also involved in the design and construction of smaller ultra-luxury vessels such as the six-star Silver Nova, in which every guest cabin will have a balcony. Owned by Silversea Cruises, Silver Nova will also be the first emission-free (during port operations) cruise ship in service. This vessel was built in the Meyer Werft shipyard in Germany and will be delivered in 2023.

Presently, European shipyards have carved a niche in the cruise ship construction market as out of the existing 283 shipyards worldwide, four out of the five shipyards specializing in the construction of cruise ships, are currently located in Italy, Germany, France, and Finland. The fifth shipyard capable of constructing a cruise ship is located in Japan (which is currently focusing only on the construction of smaller cruise ships) (Statista 2023).

The cruise ship order books for these shipyards are robust, as to date there are currently 66 new build projects in the works with 19 new vessels being delivered in 2023 alone (Cruise Industry News 2023). This is not even an industry peak. Although the cruise industry suffered a massive blow due to the COVID-19 pandemic (for both operations and construction), the industry is extremely resilient as it is estimated that there will be a complete return to normal onboard operations in 2023 (CLIA 2022). The pandemic also forced shipyards to shuffle and spread-out new cruise ship construction projects, but the industry is hopeful that soon the construction boom will return to pre-pandemic levels as well.

New build cruise ship construction projects are massive global endeavors involving numerous organizations and disciplines coming together to create new vessels with cutting edge technology that set new market standards but remain on time and as close to the original budget as possible. The processes and systems in place guiding these construction projects and stakeholder relations are complex and vary greatly from project to project depending on the organizations involved. Despite all of the great achievements displayed in cruise ship new build construction projects, there are many pain points in the collaborative processes that could be improved.

1.1 Purpose, aim and research questions

There are many different stakeholder groups involved in cruise shipbuilding processes. In a new build project, a ship owner, shipyard, architects, contractors, and consultants from numerous disciplines come together to collaboratively conceive, design, and construct a new vessel. This thesis focuses on the collaboration between stakeholders during the architectural

design phase of the shipbuilding process when these groups come together to develop and finalize the architectural and technical plans for a new vessel.

The purpose of this thesis is to design a tool to be used as a starting point template for feedback processes between stakeholders to improve the cruise shipbuilding architectural design process. The aim is to identify the most typical challenges and consequences of those challenges related to stakeholder collaboration during the architectural design phase in the cruise shipbuilding process.

The research questions to be explored are as follows:

1. What are the collaboration challenges that affect all stakeholder groups in the architectural design process?

2. What are some of the phenomena causing the collaboration challenges between stakeholders?

3. What could improve the collaboration process between stakeholders?

4. What challenge areas in the architectural design process could be discussed in an official feedback process to improve future projects?

Service design will be the methodology used in the development of this thesis project. Service Design can be defined as a multidisciplinary approach to problem solving (Stickdorn 2018, 27). In processes as complex as the ones found in the architectural design phases of a new build project, there are always areas for improvement in stakeholder collaboration. In this thesis project, service design methodologies will be applied to gain a holistic overview of the collaboration challenges in the architectural design phase and to design a tool to be used to facilitate feedback processes between stakeholders.

1.2 Structure of the thesis

There are seven chapters to this thesis report. This first chapter introduces the purpose and aim of this thesis project. The second chapter gives a brief introduction of the case company and definition of terms related to shipbuilding. The third chapter introduces the theoretical knowledge base and explores topics relating to systems thinking, network theory, organization theory, and knowledge sharing in relation to the development project. The fourth chapter outlines the service design methodology used in the development project, and chapter five describes the details of the development project process. The synthesis of the theoretical framework and methodology driving the thesis project is visualized in figure 1 below:

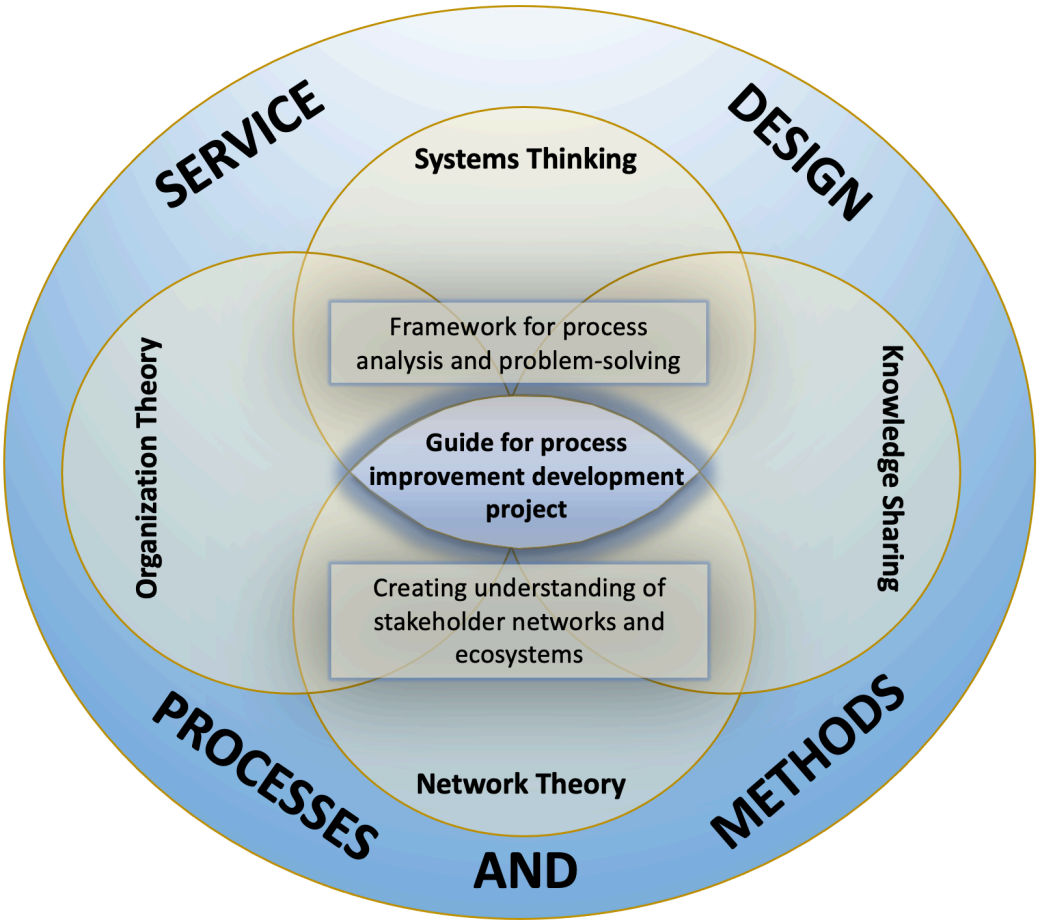

Figure 1: Theoretical framework synthesis chart

Finally, chapter six presents the results of the thesis project by answering the research questions, and chapter seven presents the final iteration of the feedback process and survey template along with final thoughts and reflections.

2 Case company and cruise shipbuilding terminology

In the following section I will introduce the case company followed by the descriptions and definitions of stakeholders and the architectural design phases that will be explored in this thesis development project.

2.1 ShipPalette- A bridge between designers and builders

Founded in 2011, ShipPalette Oy is a management consulting company based in Vantaa, Finland specializing in the architectural project management of cruise ship construction projects. ShipPalette has a deep understanding of the architectural design process as it employs specialists with decades of past work experience from the main stakeholder groups involved in the shipbuilding process (ship owner, shipyard, architect, and turnkey contractors). ShipPalette provides consulting services to assist various companies during different phases of the

shipbuilding process. ShipPalette assists and oversees projects involving cost calculations, design coordination, material selection, and project management of various cruise ship construction projects.

Acting as the bridge between organizations in the various cruise ship design processes, they are always eager to find new ways to offer solutions to optimize the collaborative shipbuilding process between stakeholders.

2.2 Cruise ship architectural design stakeholders and process briefly defined

The stakeholders and processes in a new build project can vary greatly depending on the organizations involved, but in this section, I will attempt to give a general overview of the stakeholders and processes typically involved in the architectural design phase of a new build cruise ship project.

It is first important to note that the full scope of responsibilities for each of the stakeholder groups varies depending on the new build project and the stakeholder companies involved. It is not possible to provide a definitive description of each stakeholder group that holds true in all scenarios, but a general description of each stakeholder group is outlined below for reference in this thesis development project.

There are typically four main actors in the design of a cruise ship: ship owner, architect, shipyard, and turnkey contractor. The ***ship owner (or buyer)*** is the organization that conceptualizes, purchases, owns, and operates a cruise ship brand. The ***architect*** is the organization hired by the ship owner to bring to life the concepts, visions, and desires of the ship owner through their interior designs. The architect may work with the shipyard to assist in the creation of the general arrangement plans for a ship or focus solely on the interior architectural design of a project. Depending on the size or location of the project, the architect could be an internal division of the ship owner's organization, or they could be completely separate companies contracted out by the ship owner to create the ship interior designs. In cases where this role is contracted to an outside company, there could be one main architect company or many different companies working together on different areas within the same project.

The ***shipyard (or builder)*** is hired by the ship owner and is the responsible organization tasked with taking the design plans and constructing the new vessel. The shipyard develops the technical designs, builds the steel frame, and interiors of the new vessels. The ***turnkey contractor (or outfitter)*** is typically hired by the shipyard to manage and complete the interior construction of the vessels. The full scope of construction responsibly for the turnkey contractor also varies depending on the project and organizations involved. A deeper dive into the relationships between these actors and will be explored in chapter 3.2.1.

A ***prototype ship*** is considered to be the first vessel in a new class of ships. A ***sister ship*** is a subsequent new build vessel that has a very similar layout to that of the prototype ship. All of the sister ships of a similar type grouped together are categorized as a ***class*** of ships. This thesis will explore the architectural design phase from the viewpoint of creating a new class of vessels through the steps typically taken in the development of a prototype ship in a new build project.

As mentioned in the introduction, for the scope of this thesis, the focus is on the architectural design phase of the new build shipbuilding process. Just as the scope of responsibility of the stakeholder groups can vary, the structure of the project phases are variable as well. It is the decision of the joint project teams how the new build processes will be structured and there is no one universally agreed project phase structure. For the purpose of this thesis, I will explore the architectural design process project phases through one existing example of an architectural design process, but this is by no means representative of how all architectural design processes are structured. Because of this, that is why the feedback tool that will be designed during this thesis development project is meant to be a starting point template that would need to be slightly adapted to suit the needs of different projects.

The *ISO 900:2000, Quality management systems- Fundamentals and vocabulary* according to Lockyer and Gordon (2005, 1) defines a project as a "unique process, consisting of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective confirming to specific requirements including the constraints of time, cost, and resources". According to Lockyer and Gordon (2013, 4), there are four main overlapping phases to any project: conception, development, realization, and termination.

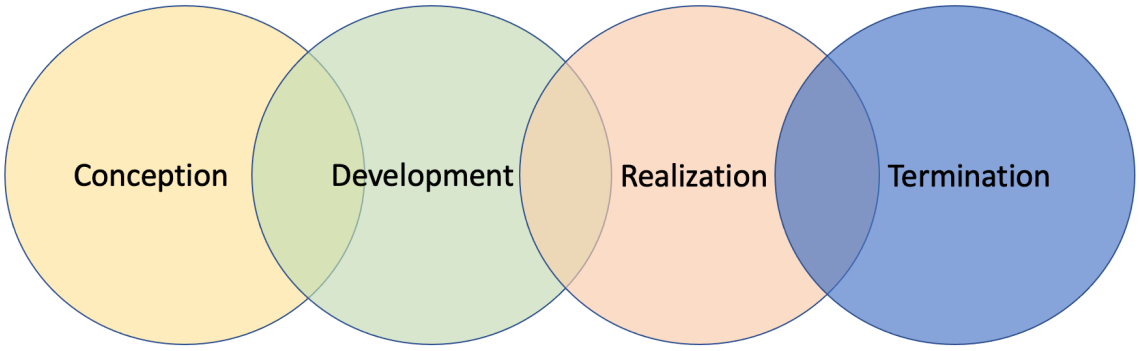

Figure 2: The four phases of a project (adapted from Lockyer and Gordon 2013, 4)

The architectural design phase fits into the conception and development phases of the traditional project phases outlined above. For the structure of the cruise ship new build

architectural design phase explored in this thesis, the architectural design phase can be generally broken down into the following phases: Concept Design, Master Plan, Basic Design, and Detail Design phases (figure 3).

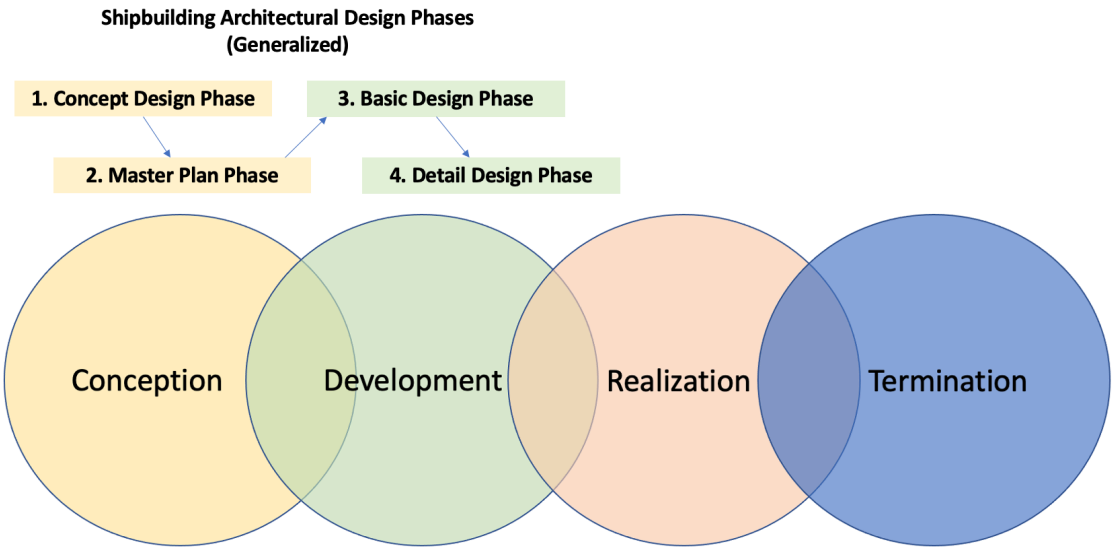

Figure 3: Four phases of architectural design process (generalized) visualized on top of the four project phases (adapted from Lockyer and Gordon 2013, 4)

In the ***Concept Design*** phase, the concept for a new vessel is created, in the ***Master Plan*** phase, the skeleton of the ship designed. In the ***Basic Design*** phase, the preliminary venue steel designs and design concepts are agreed, and in the ***Detail Design*** phase, all venues are fully designed (architecturally and technically). It is important to note that a new build cruise ship project for a prototype vessel can take 5+ years of work from start to final delivery. The architectural design phase explored here can take 2+ years to finish for a prototype vessel and must be completed and agreed before interior architectural construction can begin.

The detailed steps taken by each stakeholder group in each phase will be outlined during the development project in chapter 5.2.

3 Thinking of stakeholders as a system of network organizations sharing knowledge

This chapter presents the theoretical knowledge base for this thesis. In order to make sense of the connections and interactions between stakeholders in the shipbuilding process, it is important to understand the networks that these relationships form and make sense of these interactions through a systems thinking lens. This will assist in the analysis and answering of the research questions.

For the purpose of the thesis (the development of a feedback tool), a study of knowledge sharing along with the theories presented in organization theory support the development of the feedback process and tool.

3.1 Systems Thinking

Before beginning the development project for this thesis, it is important to first understand the shipbuilding process as a system that can be viewed through the lens of systems thinking. In academic literature there has been much debate and numerous studies seeking to provide a conclusive definition for the concept of systems thinking. Beginning with the literal definition of the word ***system***, the Britannica Dictionary defines it as "a group of related parts that move or work together".

Systems thinking can be viewed as "literally, a system of thinking about systems" (Arnold & Wade 2015,670). In this way of thinking we strive to understand the relationship between systems by applying critical thinking and examining mental models (D. Cabrera & L. Cabrera 2015, 14). In a previous study Cabrera, Colosi, and Lobdell (2008, 306-307) introduced the DSRP (distinctions, systems, relationships and perspective) model of systems thinking to guide our mental models when attempting to make sense of a system. Cabrera et. al (2008) theorizes that these four DSRP points are the foundation of systems thinking. A ***distinction*** is made when one is able to conceive an identity for something and additionally exclude what something is not. A ***system*** is described as "a whole made up of two or more related parts". A ***relationship*** can be uncovered in finding the traits that create a distinction between two concepts (Cabrera et. al 2008, 305). When thinking of a system, it is important to also consider the relationship between the various parts. A ***perspective*** allows you to do this as it gives you a frame of reference or vantage point from which to analyze any given relationship in a system. According to Cabrera et. al (2008, 305-306), the application of these DSRP rules of systems thinking to any given situation or grouping of information allows someone to outline patterns in the associations between ideas, thoughts, or things and allows us to change the way we view connections we encounter in the world. They theorize that systems thinking is not an action taken by an individual, but a result that is achieved by changing mental models.

The change in thinking brought about by adapting a systems thinking view is summarized by Arnold and Wade (2015, 673) in reference to a study by Squires, Wade, Dominick and Gelosh 2011), which summarizes that systems thinking is the ability to:

- Bring together many different perspectives
- Problem-solve in areas where there are the boundaries and scope of an issue or entire system may be unclear
- Comprehend a variety of possible contexts for system operations

- Recognize inter-and intrarelationship types and recognize their dependencies
- To have knowledge of complex system behavior and ultimately the ability to accurately anticipate what the effects of change will be to the system as a whole (Arnold and Wade 2015, 673)

To understand systems thinking from another point of view, according to Arnold & Wade (2015), a study by Meadows in 2008 summarizes that there are three fundamental building blocks to systems thinking: ***elements***, ***interconnections***, and a ***goal or function***. They further build upon this observation by stating that the key idea that differentiates systems thinking from a system is that systems thinking must have a clearly defined goal or function (Arnold & Wade 2015, 670). In their study comparing and contrasting the different systems thinking models, Arnold & Wade (2015, 675-676) provides the following figure (figure 4) that summarizes their theory that systems thinking is comprised of a skillset that can be utilized to recognize and make sense of existing systems, forecast behaviors, and create ways to make adjustments towards preferred outcomes. They report that this skillset shown in figure 4 below can also be defined as a system:

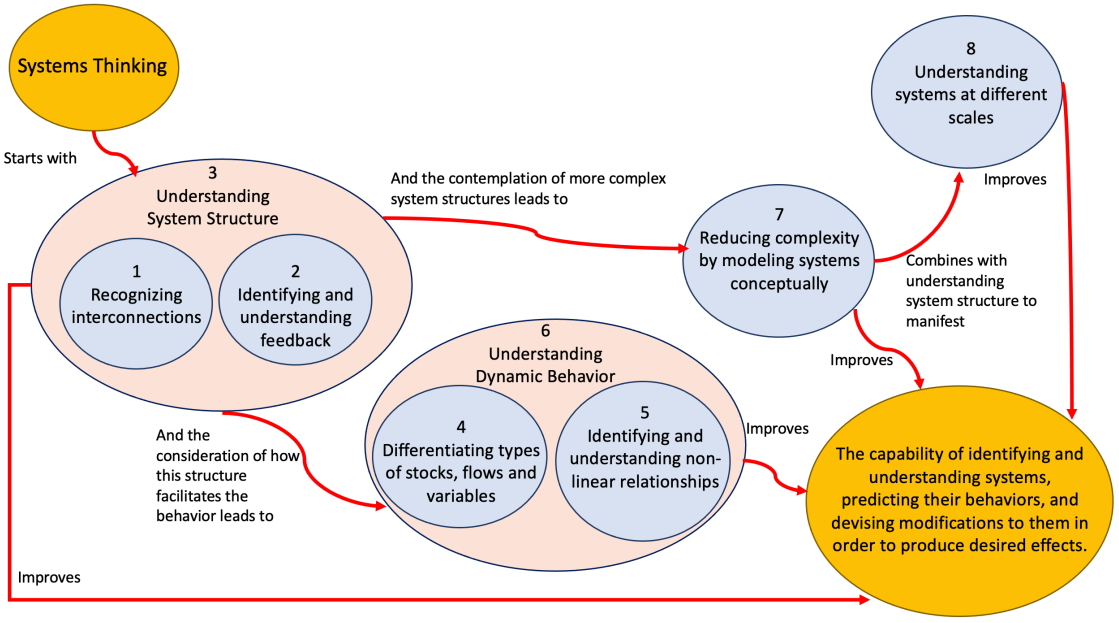

Figure 4: Adapted from Systems Thinking Systemigram (strong connections) (Arnold & Wade 2015, 676)

Systems thinking is also a way of problem solving. D. Cabrera & L. Cabrera (2015, 14) posit that systems thinking research sprang forth from the desire to answer the question "What is the root crisis?". Goodman (1997) outlines this problem-solving application by stating that systems thinking can be used to solve problems that possess the attributes below:

- The issue is important.
- The problem is chronic, not a one-time event.
- The problem is familiar and has a known history.
- People have unsuccessfully tried to solve the problem before. (Goodman 1997)

Aiming to understand the collaboration challenges between stakeholders in the architectural design process of a new build vessel is not quite a wicked problem, but still a very difficult and complex challenge. According to D. Cabrera and L. Cabrera (2014, 15), complexity is the root cause of any wicked or difficult problem. However, they theorize that contrary to popular belief, "underneath complex things are [not] complicated explanations... underneath complex things are simple rules (D. Cabrera and L. Cabrera 2014, 36)." In applying the DSRP (distinction, system, relationship, perspective) viewpoints to creating an understanding of a system, we can begin to make complex problems more accessible by understanding the building blocks of all the elements at play, and how they are related by viewing the problem from all perspectives.

Systems thinking compliments service design in that it can assist a designer in embracing the complexity found in complex challenges or wicked problems. In seeking to understand all of the underlying parts that make up the whole of a system, a designer is able to adapt their designs to many different contexts and seek to bring a human-centric element to the understanding and crafting of new systems in their designs (J. Darzentas and J.S. Darzentas 2014, 11-13).

Understanding these basic concepts, we can use systems thinking as a tool to develop an understanding of the system of stakeholders, their relationships, and collaboration challenges in the architectural design process.

3.2 Network Theory

If systems thinking presents a way of understanding problems and processes through the lens of defining various actors and their relationships within a system, we can also view these interactions from a different angle. Network theory presents a lens through which we can observe power dynamics, communication, and human sensemaking. In this domain the main focus is the relational ties between actors (Nimmon & Cristancho 2019, 331-332).

Shipbuilding projects are executed through the creation and collaborative efforts of an interorganizational network of organizations. Interorganizational networks are formed by the collaborative activities between multiple organizations. These collaborations strengthen knowledge bases and increase innovative potential (Goossen 2015). Möller and Svan (2003,

212) describes a “network of organizations” as two or more organizations that are relationally linked.

Each stakeholder group is comprised of subgroups from differing organizations that all come together to work towards a common goal (the successful completion of a new cruise ship). Vital to successful navigation of these complex projects is the strong leadership and management required to bring together many different organizations with different disciplines working on overlapping elements in the architectural design process. Value is co-created in inter-organizational networks through the outputs of the joint activities of the different specialized organizations coming together to work towards a shared goal (Monden 2011, 18).

Interorganizational networks are interdependent and have great benefits, but the stakeholder relationships are not always equal. Power imbalances between stakeholders can have negative effects on collaborative processes and relationships between companies. In the case of relationships between stakeholder groups in the shipbuilding process, there is always an element of power at play. In the stakeholder network relationships, power can be defined as the ability of a stakeholder or group of stakeholders to control and steer objectives and outcomes even if there is pushback or discontent from other stakeholders (Sacchetti and Sugden 2003, 671-674). The power dynamics in the shipbuilding stakeholder network can be caused by many factors, but one of the primary influences of power can be felt through the relationships which are formed in the hierarchy of organizations in the network. Monden (2011, 16) writes that a “network usually consists of a core company and many other companies that will obey the instructions of the core company. The core company will partake in only the functions in which it is outstanding, and outsource all other functional areas to the others, each according to its own competence.” In the architectural design phase, the two core stakeholders holding power in the network are the ship owner and the shipyard. The shipbuilding network in this thesis project will be outlined in more detail in the chapter 3.2.1.

Riemer & Klien (2006) provides a general definition of ***network management*** from Konsynki and McFarlan in 1990 as “the coordination of activities between companies”. Network management acknowledges that different stakeholders may not always have aligned agendas, but to ensure value creation there needs to be a baseline of mutual planning between a few of the connected stakeholders in the network. The four key functions of network management are framing, activating, mobilizing, and synthesizing (Järvensivu & Möller 2009, 658). In shipbuilding projects, perhaps one of the most challenging aspects of bringing together an inter-organizational network lies in the ability to synthesize the actions and relationships of the temporarily established project-based network of stakeholders. The goal of synthesis in network management is summarized below:

> “Research on network management also addresses *synthesizing* the network by creating the environment and enhancing the conditions for favorable,

> productive interaction among network participants. Managers must find a way to blend the various participants- each with conflicting goals or different perceptions or dissimilar values- to fulfill the strategic purpose of the network (Agranoff & McGuire 2001, 300)."

In this thesis project, the transfer and synthesis of knowledge between stakeholder groups is of particular importance to highlight. Knowledge sharing will be discussed in more detail in chapter 3.4.

This thesis project will also consider the density in the stakeholder network. ***Density*** is a concept outlined by Cap et. al (2019,23), that seeks to measure the connections between stakeholders in a network by calculating the ratio of established ties as compared to the total amount of all potential ties within a network. They also hypothesize that dense connections are a driver of effective network exploration.

Network Life Cycle

Over the course of the architectural design phase, a vast network of shipbuilding stakeholders is established to innovate, collaborate and co-create new plans and ship designs. Riemer & Klien (2006) provide an illustration (figure 2) of the different phases of the life cycle of a network from start to finish. This figure presents a revolving cycle where a network is first initiated, then goes through the phases of transformation, configuration, implementation, and stabilization, but is ultimately dissolved after the project or goal reaches its conclusion:

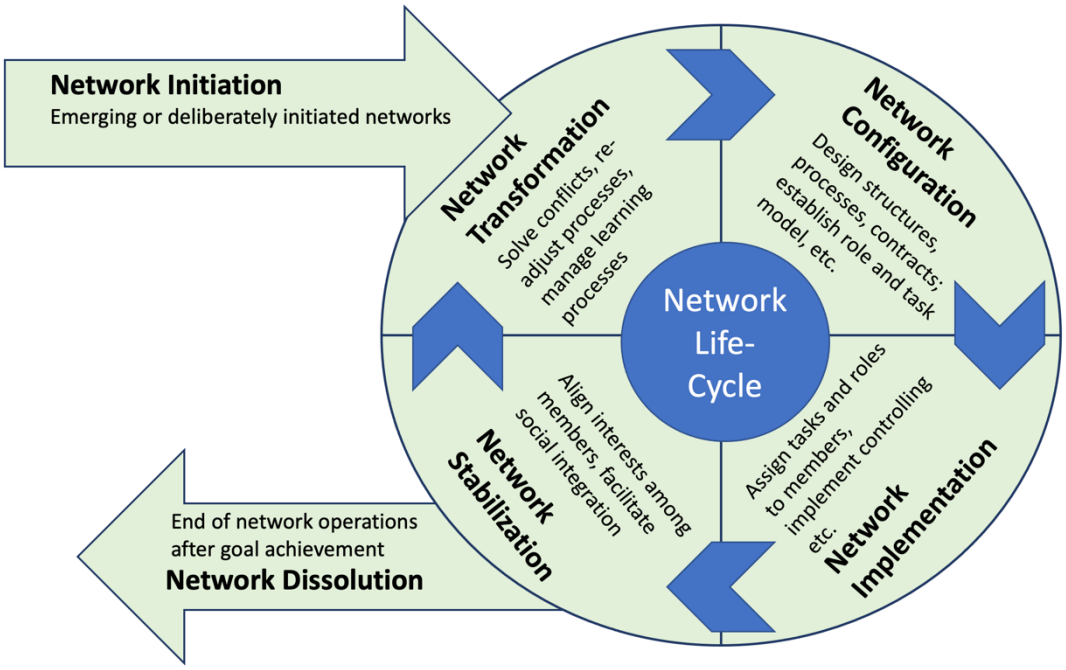

Figure 5: Adapted from the network life-cycle model (Riemer & Klien 2006, 20)

As we discuss the life cycle of a stakeholder network, it is important to also put it in context of the architectural design process that will be explored in this thesis. The architectural design phase in a new build shipbuilding project encompasses the first five phases of the network life cycle, through network initiation, configuration, implementation, stabilization, and transformation. However, it does not reach the network dissolution stage. At the start of the architectural design phase, we begin with a small network of closely related stakeholders, and as the architectural design phase progresses, the network rapidly expands to include more and more stakeholders from many different organizations. The architectural design phase concludes when the physical construction of the ship interiors based on the agreed architectural design commences. This is when the new build project stakeholder network is still in the middle of its life cycle. While stakeholders from various organizations join and depart the project at different points, the network as a whole is not fully dissolved until after the successful completion and delivery of a new ship.

3.2.1 A brief description of architectural design stakeholder network

The main stakeholder groups we will explore in this thesis are ship owners, shipyards, architects, and turnkey contractors (or outfitters). These architectural design phases and stakeholder involvement (entrances and exits to project work) vary depending on the stakeholders involved, but a generalized picture can still be presented:

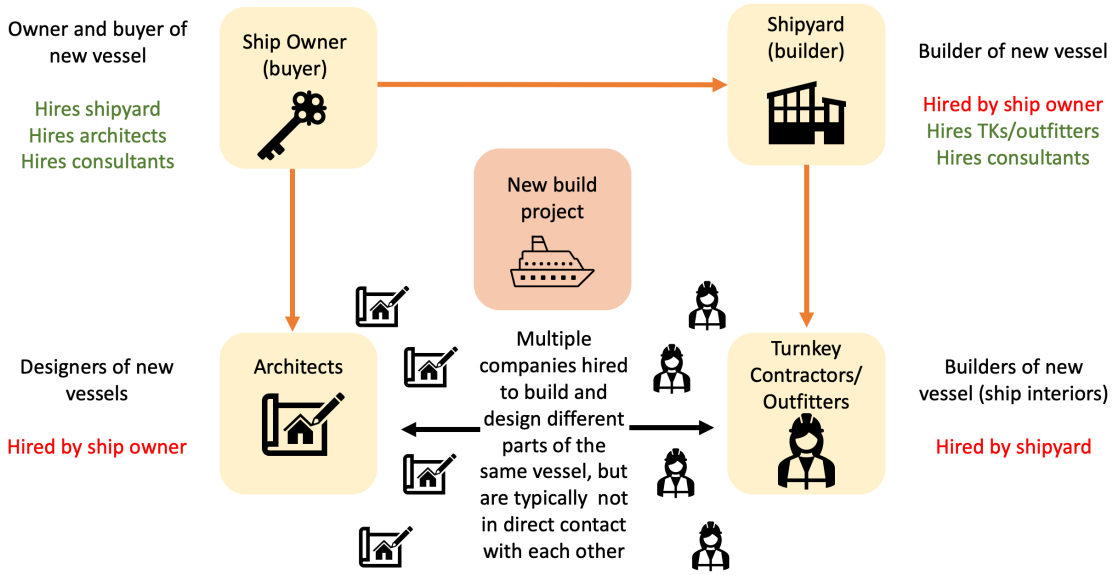

Figure 6: Typical cruise ship new build project stakeholder network (main stakeholders)

In this network, the ship owner (buyer) enters into a direct contract with the shipyard (builder). The architects are then typically hired directly by the ship owner and the turnkey (TK) contractors are hired directly by the shipyard. There is one ship owner and one shipyard, but there can be many different architect and TK/outfitter companies comprising the final

network. It should also be noted that even within the internal organizations of the ship owner and shipyard there are many different departments with varying levels of internal connectivity.

Additionally, there are various consulting companies (such as the thesis case company Ship-Palette) with different specialties that are hired by the ship owner, shipyard, or TK/outfitter organizations to provide additional knowledge and expertise to the shipbuilding network and process. All of these stakeholders work within the same network, however, due to the nature of these relational contracts, there are rules and limitations as to how knowledge and information can flow across the organizational network. This has a direct impact on the density of the organizational network and can cause problems that will be further explored in the development project phase of this thesis.

When adapting a systems thinking view to the analysis of issues that arise within this stakeholder network it is useful to think from all perspectives. D. Cabrera and L. Cabrera (2015, 94-95) propose visualizing this through illustrating ***perspective circles*** (or P-Circles). Through this illustration, an idea is presented and the various perspectives to be considered are shown surrounding the idea. This central idea can be interchangeable, but the perspectives are constant and are illustrated with an eye. These perspectives can also be further broken down to dive deeper into the system affecting the topic being explored. Applied to the development project and the stakeholders involved, the perspective circle for the start of this project is as illustrated in figure 7 below:

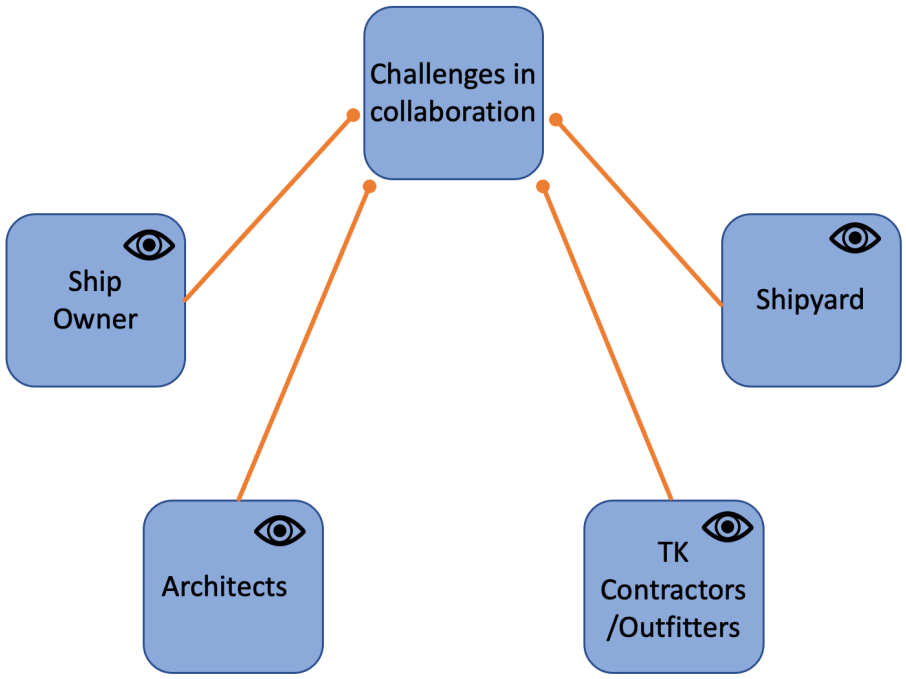

Figure 7: P-Circle applied to development project. Adapted and modified from D. Cabrera and L. Cabrera (2015,94)

The aim of the thesis is to identify the most typical challenges and consequences of those challenges related to stakeholder collaboration during the architectural design phase in the cruise shipbuilding process. This challenge will be studied from the various perspectives of the main stakeholder groups involved in the process that were presented in this chapter.

3.3 Organization Theory

Clegg et. al (2016, 280) theorizes that "organization studies [have] contributed greatly to our understanding of a network society". Cheney et. al (2004, 7) define an organization at the most basic level as "a pattern or network of energies and interactions". On a higher level, they refer to a definition from Barnard (1968) that defines an organization as "a system of consciously coordinated activities or forces of two or more persons". They hypothesize that the purpose of an organization is to expand the ability to complete a task more efficiently than a single person would be able to do, and the purpose of the actions undertaken by an organization are aimed at completing a precise objective (Cheney et. al 2004, 8).

Building on this idea, King et. al (2010, 298) feels that additionally an organization is a social actor:

> "Organizations are externally defined as actors by other actors in society… Organizations are a type of social tool designed by individuals to accomplish purposive collective action on a scale and in a manner that is both unattainable by any given individual. Once fashioned as such, organizations take on a life of their own and are held to a standard of responsibility analogous to that attached to individuals…An organization's self-view, often manifest in its identity and goals, underlies decision making and deliberation within that organization, thus forming the basis for intentionality (King et. al 2010, 298)."

Thus, it is organizational culture that is most often the dynamic which shapes not only how an organization behaves internally, but ultimately shapes how it interacts with external network partner organizations. Schein (1997) describes three levels of organizational culture: artifacts, espoused values, and basic underlying assumptions. According to Schein, the highest level (and most difficult to understand) is that of ***artifacts***, which are expressed through "visible organizational structures and processes". At the next level we find ***espoused values***, which are expressed through the strategies, goals, and philosophies of an organization. On the deepest level rests ***basic underlying assumptions***: "unconscious, taken-for-granted beliefs, perceptions, and feelings". Schein feels that this deepest level of basic underlying assumptions is the actual genesis of the values and action of an organization.

According to Gupta, Iyer and Aronson (2000), organizational culture is of vital importance when it comes to the topic of knowledge management. An organization with an open culture

which motivates employees to properly manage effectively share their knowledge will have an advantage in the realm of knowledge management. However, it can be difficult to find the proper motivators to get people internally to effectively share information within an organization. This challenge is intensified when thinking of how to establish a culture of knowledge sharing externally within network organizations as seen, for example, in the shipbuilding stakeholder network where the competitive nature of the relationships can make stakeholders less willing to freely share certain information in a project. Ismail, Yousif, and Fraidoon (2007, 25) outline the four critical factors in organizational culture required for successful knowledge sharing (which also apply to interorganizational stakeholder networks):

- Trust between parties that expresses the confidence in the actions and reliability of others
- Effective communication between parties
- Efficient IT systems to manage and share data
- Reward systems as a motivator for sharing
- Organizational structures that allow for ease of knowledge flow (Ismail et. al 2007, 25)

Organization culture is one facet of knowledge sharing that will be explored more in depth in the next chapter (3.4).

Virtual teams

There are different types of organizational structures, but this thesis focuses mainly on network organizations coming together to work on a project. A network organization is defined as "a cluster of organizations working together, often at a distance (Luhman and Cunliffe 2013, 106)". As technology has advanced, cruise shipbuilding has slowly moved from the majority of collaborations between organizations being carried out face-to-face, towards leaning heavily on virtual technology and protocols which require much less face-to-face contact between stakeholder groups (particularly in the architectural design development phases of a new build project).

Generally, the higher-level project representatives do meet face-to-face at regular intervals, but much of the work and team meetings between stakeholder organizations in the architectural design phase is conducted in virtual spaces. Marlow, Lacerenza, and Salas (2017, 576) report that according to Gibson and Cohen (2003), "one of the defining features of virtual teams is that communication primarily occurs through virtual tools". Although these teams

are not 100% virtual all the time, enough of the workload takes place in virtual spaces that the issues affecting virtual teams also applies here.

In a study by Brewer (2015, 5), it was discovered that when comparing the differences between international and non-international virtual teams' collaborations that miscommunications did not occur with any more frequency in international teams, however, the outcomes of these miscommunications are more severe as people lack the skills to handle miscommunications in an international work environment. Brewer (2015, 50) cites numerous influencing factors for miscommunication in international virtual teams:

- Language
- Information sharing
- Tone
- Time
- Haste
- "Netiquette"
- Delivering criticism
- Social distance
- Rank
- Context
- Directness
- Understanding the other (cultural understanding)
- Technology (Brewer 2015, 50)

Collaboration challenges within the organizational network of stakeholders arising from working in a virtual setting can also be managed through organizational management, practices and culture. However, virtual team issues are not the only challenges faced in the organizational stakeholder network.

Silos and Bureaucracy

Another relevant topic of discussion in organization theory in relation to this development project is that of silos and bureaucracy. In organizational discussions we often hear of "silos". Typically associated with negative connotations, this term describes the divisions and barriers that impede fully functional communication and knowledge exchange within an organization or network. Because of this phenomenon, which is mostly cultural, there has been much research in the area of how to bridge or eliminate these divides (Bento, Tagliabue, and Lorenzo 2020).

Bento et. al (2020, 2) explain that "networks are understood as the structures of social systems". They feel that silos are "subgroups in webs of interaction (Bento et. al 2020, 3)".

Ultimately, they theorize that although silos are usually thought to be an issue related to leadership, that it is at the core a systems problem. It is proposed that silo related systems problems can be solved by breaking down and understanding its three key attributes: structure, process, and function (Bento et. al 2020).

Another organizational phenomenon that carries a negative connotation and is likewise viewed as a barrier to fully functional communication and knowledge exchange is that of bureaucracy. Luhman and Cunliffe (2013, 15) define bureaucracy as "the management or administration of an organization based on a hierarchy of authority, division of labor and formalized rules and procedures". Luhman and Cunliffe (2013, 15-16) refer to the work of Max Webber (1947,1978) who is the creator of the theory of bureaucracy. According to Webber, this authority-based theory views bureaucracy as an "iron cage" where actors are stripped of their autonomy and are handicapped by the "drive for rationalization".

Due to the competitive nature of the stakeholder relationships in shipbuilding projects and the fact that after a project is completed and a stakeholder network is dissolved, a new project could see a new stakeholder network established in which some of the participants work for the direct competitors of some previous network partners. Because of this, it is understandable that there are some forms of checks and balances (in the form of bureaucracy) as to the information that can be shared within a network, however, a balance should be found in protecting vital competitive information through silos and bureaucracy and efficiently sharing the necessary information to keep stakeholder collaboration quality high.

Diagnostic Methods for Organizations

The purpose of this thesis is to create a feedback tool that can be used as a template for a starting point for feedback processes between stakeholders to improve the architectural design process. The information gathered in the feedback process would be used to improve stakeholder collaborations in future architectural design processes. To do this, it is important to present the theory behind the structure of the feedback tool will be designed in the development project.

The purpose of doing an organizational diagnostic study is to "assess an organization's current state and discover ways to solve problems, meet challenges, or enhance performance (Harrison 2005, 1)". There are three key elements of organizational diagnostic practice:

- Process- the process by which a researcher works with an organization (or organizational network) to develop a diagnostic study, conduct the study, and finally gather insights and provide feedback.

- Modeling- the use of models to create proper frames for issues, steer the data collection, and pinpoint problem and opportunity areas.

- Methods- the methods used to gather, analyze, and synthesize the diagnostic data. (Harrison 2005, 1)

In this thesis development project, a feedback process will be designed using service design methods to model the specific feedback areas, and the information gathering survey/questionnaire template by which the feedback will be collected will also be prototyped and tested.

Harris (2005, 21-22) provides a table which compares the four main methods used to gather diagnostic data shown below in table 1.

Method	Advantages	Disadvantages
Questionnaires Self-administered schedules, fixed choices (Church & Waclawski 1998; Faletta & Combs 2002; Kraut 1996)	Easy to quantify and summarize; quickest and cheapest way to gather new data rigorously, neutral and objective; useful for large samples, repeat measures, and comparisons among units to norms; standardized instruments contain pretested items, reflect diagnostic models, and are good for studying attitudes.	Difficult-to-obtain data on structure and behavior; little information on how contexts shape behavior; not suited for subtle or sensitive issues; impersonal; risks: nonresponsive, biased or invalid answers, and overreliance on standard measures and models.
Interviews Open-ended questions based on fixed schedule or interview guide (Greenbaum 1998; McCracken, 1988; Waclawski & Rogelberg 2002)	Can cover many topics; modifiable before or during interview; can convey empathy, build trust; rich data, allows understanding of respondents' viewpoints and perceptions.	Expensive and difficult to administer to large samples; respondent bias and socially desirable responses; noncomparable responses; difficult to analyze responses to open-ended questions; modification of interviews to fit respondents recuses rigor.

Observations Structured or open-ended observation of people and work settings (Lofland & Lofland 1995; Weick 1985)	Data independent of people's self-presentation and biases; data on situational, contextual effects; rich data on difficult-to-measure topics; data yield new insights and hypotheses.	Constraints on access to data; costly and time-consuming; observer bias and low reliability; may affect behavior of those observed; difficult to analyze and report; less rigorous, may seem unscientific.
Workshops, **Group Discussions** Discussions on group processes, culture, environment, challenges, strategy; directed by by consultant or manager; simulations, exercises (Biech 2004; Schein, 1998)	Useful data on complex, subtle process; interaction stimulates creativity, teamwork, planning; data available for immediate analysis and feedback; members share in diagnosis; self-diagnosis possible.	Biases due to group processes, history and leader's influence; requires high levels of trust and cooperation in group; impressionistic and non-rigorous; may yield superficial, biased results and unsubstantiated decisions.

Table 1: Comparison of methods for gathering diagnostic data (Harris 2005, 21-22)

For use in this thesis project, observations as a data gathering method would not be practical, but questionnaires, interviews, and workshops/group discussions as a means of gathering diagnostic data will be explored further in the development project chapter of the thesis project.

3.4 Knowledge Sharing

The final pillar of the theoretical framework for this thesis is knowledge sharing, which is in the discipline of knowledge management. Shipbuilding is a system which brings together a diverse network of interorganizational stakeholder groups working together towards the common goal of successful completion of a new cruise ship. According to Vargo & Lusch (2014, 10), the shared goal of all stakeholders is "value cocreation through resource integration and service-for-service exchange". They further define ***service*** as:

> "…a *process* of one actor doing something for another-a beneficiary. The application of knowledge and skills…Thus we more formally define 'service' as the 'application of competences (knowledge and skills) for the benefit of another entity or the entity itself (Vargo & Lusch 2014, 12)."

Therefore, I argue that the ability to effectively transfer, share, and integrate knowledge between stakeholder groups is of the upmost importance when collaborating on a shipbuilding project. During the architectural design phase, in order for the concept for a new vessel to ultimately become a tangible design, the knowledge of a vast network of stakeholders must first be integrated.

Despite being studied in depth for centuries, the exact definition of knowledge varies in academic texts. In current theories however, there has been a consensus that knowledge goes deeper than simply being raw data or information. Davenport and Prusak (1998, 5) theorize that ***knowledge*** is a "fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information". They go further to posit that knowledge is uniquely derived, comprehended and utilized "in the minds of individuals". They conclude their definition by stating that in an organizational setting knowledge is contained not only in physical documents and other tangible locations, but can also be found within organizational "routines, processes, practices, and norms".

To break it down one level further, knowledge can be divided into two main categories: tacit knowledge and explicit knowledge. ***Explicit knowledge*** is tangible knowledge that is easily communicated and transmitted between individuals, whereas ***tacit knowledge*** is uniquely individual and is expressed through mental models and behaviors of people (Nonaka 1994, 16-17). In shipbuilding, a tacit knowledge base is developed, managed, and passed through the experiences of all the employees working in the stakeholder networks. The explicit knowledge base is an amalgamation of all the physically recorded and transmitted knowledge sources (files, documents, contracts, plans/schematics, etc.). ***Knowledge sharing*** is the flow of knowledge between individuals within an organization in a process through which "knowledge held by an individual is converted into a form that can be understood, absorbed, and used by other individuals (Ipe 2003, 341)".

In a multidisciplinary project across a network of organizations, it is even more important that a focus on proper processes for knowledge sharing and knowledge management be in place to help mitigate problems that arise from a lack of coordination of vital knowledge flow between stakeholder groups.

Implications of knowledge sharing and management shortcomings can be expressed through deficiencies in the passage of critical information and knowledge through the stakeholder network. This can have disastrous effects on a shipbuilding project both in terms of quality and network relations. When knowledge is not properly transferred and shared this can lead to information complexity (Naveed et. al 2001, 1427). In their study of the effects of

information complexity on construction quality, Naveed et. al (2001) discovered many driving factors behind what causes this phenomena:

- Lack of effective communication between stakeholders
- Lack of appropriate communications medium
- Not getting the necessary information at the right time
- Delay in accessibility to accurate information
- Poor quality of the information content
- Poor communication skills
- Complexity of the project
- Unpleasant relationship between the stakeholders
- Slow information flow between parties (Naveed et. al 2001, 1434)

These were just some of the many examples they listed. In the development phase of this project I will seek to uncover some of the challenges in collaboration between stakeholders specific to the architectural design process. Many of these challenges are related directly to deficiencies in effective knowledge sharing practices and processes.

I have established that the shipbuilding process is, at its core, an exchange of knowledge and skills between stakeholder networks that were established with the common goal of building a new vessel. Therefore in order to later search for gaps in knowledge sharing and collaboration between a network of stakeholders, it is important to highlight the factors that influence knowledge sharing itself. Agranoff & McGuire (2001, 300) stated that "…in network management, empowerment is based on information rather than on authority". I believe this means that for a shipbuilding network to be managed in such a way that allows it to operate optimally, that it must be managed from a position of efficient knowledge transfer and sharing between all parties rather than tight limitations and unnecessary bureaucratic barriers to knowledge sharing.

Ipe (2003) conducted a study in which she sought to outline the driving forces that influence effective knowledge sharing. Although this study is focused on a single organization, I believe this theory also applies to knowledge sharing within the shipbuilding network. In her study she pinpoints four elements that make up the act of knowledge sharing within an organization. Encapsulated between the boundaries of organizational culture, she illustrates that the overlapping relationships and effects of the nature of knowledge, motivation and opportunities to share directly impact the overall act and quality of knowledge sharing as shown in figure 8 below (provided by Ipe 2003, 352).

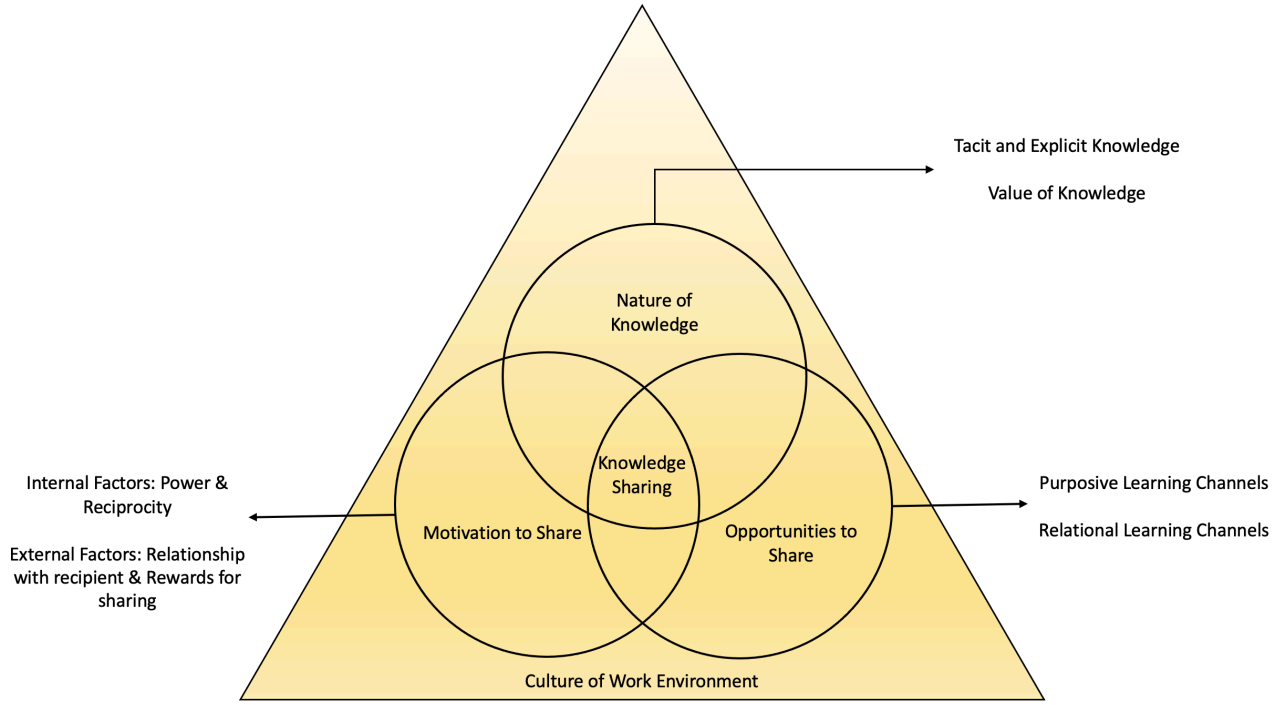

Figure 8: Adapted from factors that influence knowledge sharing between individuals in organizations (Ipe 2003, 352)

The feedback tool that will be designed in the development phase of this thesis project is a vehicle to bolster knowledge sharing within the stakeholder network by addressing a gap discovered in the opportunities to share circle. Ipe (2003, 349) describes the opportunities to share area as being divided into purposive and relational learning channels. In purposive learning channels, knowledge is passed through more formal and structured interactions. In relational learning channels, knowledge is passed through more informal communication practices. The feedback tool to be developed would be an example of an opportunity to share knowledge between organizations through a structured, purposive learning channel. The influence of a feedback tool on knowledge sharing between the stakeholder networks will be addressed in more detail in the results chapter of this report.

3.5 Bringing the theoretical framework together

The different theoretical concepts discussed in this chapter come together to form part of the theoretical framework for this thesis project. Illustrated in figure 9 below are the concepts discussed and their equal influence in the study of all research questions. The diagnostic tools presented in the organization theory section helped to frame the structure of the feedback process and tool that was designed in the development project.

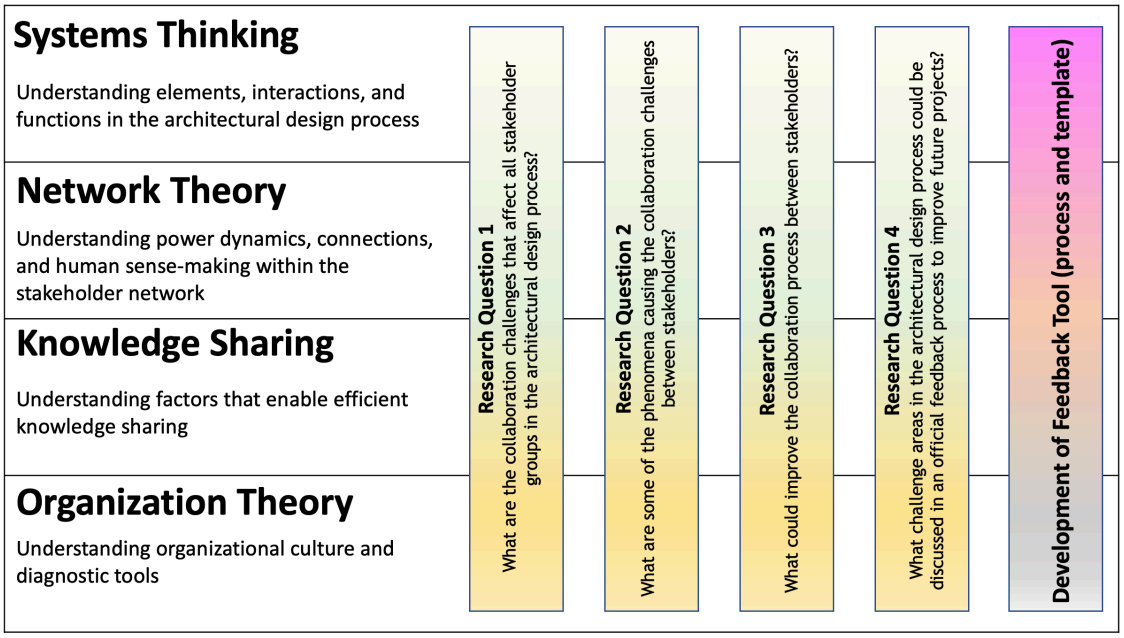

Figure 9: Theoretical Knowledge Base Synthesis- The four areas of theory and the research questions and development project they support

The final pillar of theoretical framework is service design. Service design processes and methodology will be discussed in the following chapter.

4 Service design methodology

In this chapter of the thesis, I will outline the methodology used for the development project. ***Service design*** was defined in Chapter 1 as a multidisciplinary approach to problem solving (Stickdorn 2018, 27). This chapter will give a brief overview of service dominant logic (S-D logic), design thinking, service design, and how they are related. I will then detail the specific service design process used in the development project.

4.1 Influences of service dominant logic and design thinking

Service design is a methodology and field of study that is in a constant state of evolution. There are two areas of study that I argue are intrinsically linked to service design: design thinking, and service dominant logic (S-D logic). I argue that it is important to have a basic understanding of these concepts in relation to each other to fully be able to embrace the purpose and mindset needed to execute a service design driven development project. The ideas and concepts that define design thinking and S-D logic directly influence concepts found in the service design methodology.

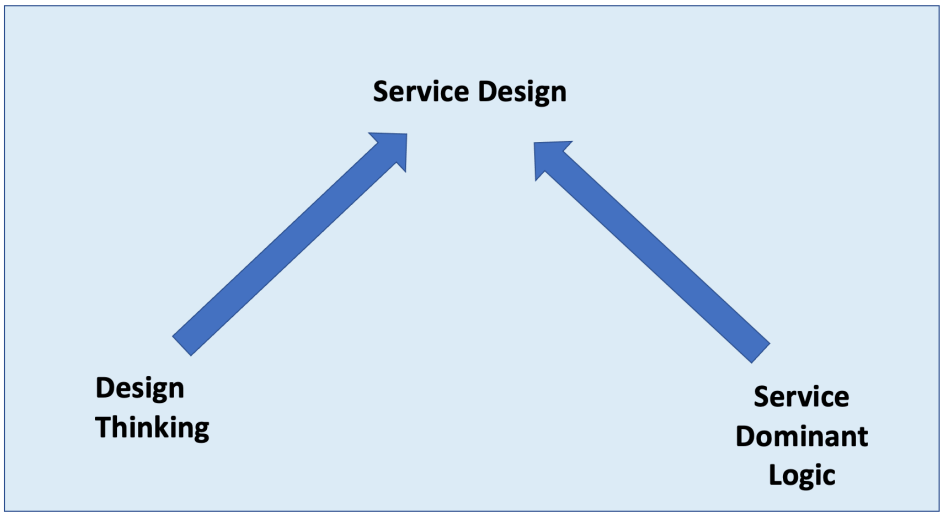

Figure 10: Service design, design thinking, and service dominant logic

Service Dominant Logic

Service dominant logic (S-D-logic) was first published by Vargo and Lusch in 2004. The model of "goods-dominant logic" (G-D logic) is presented as the previously dominant economic world view, in which goods (physical products) are the main units of value exchange. In this paradigm firms are the sole creators of value through the production of physical products where the value is then completely consumed by the end user (Vargo and Lusch 2014, 1-6).

They propose a fundamental shift in thinking that reframes all economic sectors (extraction, manufacturing, and service sectors) as at their core belonging to the service economy. In Chapter 3, the definition of ***service*** was provided as being "a process of one actor doing something for another- a beneficiary (Vargo and Lusch 2014, 12)". It is through this lens they argue that since all exchanges of knowledge and skills (whether the unit of exchange is tangible or intangible) benefit both the giving and receiving actors, this ***service-for-service exchange*** is the foundation of all economic exchange (Vargo & Lusch 2014,12).

This is important to note as this thesis studies part of the shipbuilding process which can be traditionally viewed as an activity belonging strictly to the manufacturing sector. However, ultimately the shipbuilding process can be seen as a massive service exchange ecosystem where different organizations exchange knowledge and skills in the pursuit of the end goal of building a new vessel. Keeping the thesis development project in mind, Vargo & Lusch (2014, 179-195) propose that S-D logic can also be applied to strategic thinking in the following five ways:

Area of influence	Strategic thinking application
Service Ecosystems	Developing a systems view of exchange
Collaboration	Designing for density and relationships
Value Proposing	Co-creating value with multiple stakeholders
Designing	Developing value-creating ecosystems
Configuring	Taking advantage of unstable environments

Table 2: Strategic thinking applications of S-D logic (Vargo & Lusch 2014, 182-195)

The perspectives behind the strategic thinking applications of S-D logic outlined by Vargo and Lusch above are also embedded in the theoretical framework (systems thinking, network theory, and knowledge sharing) that was discussed in Chapter 3 of this thesis report.

Design Thinking

Design thinking is one of the foundational mental models behind the service design methodology. Design thinking can be defined as "an analytic and creative process that engages a person in opportunities to experiment, create and prototype models, gather feedback, and redesign (Razzouk & Shute 2012, 330)". Design thinking is a creative thinking centered problem solving mindset where emphasis is placed on ideation and iteration of many possible solutions that are designed and tested with user centered insights as a guide (Brown and Katz 2009, 22-23).

In a study Dorst (2011 524-525) theorizes that the core practice behind the problem-solving nature of design thinking is the practice of problem ***framing***. Framing is a term that describes the formation of a specific viewpoint for a problem or challenge to which a problem-solving process can be applied to generate a valuable solution. Dorst (2011, 531) posits that the act of problem framing has great value in organizational settings in the context of solving complex problems. The study finds that in framing organizational design challenges, design thinking aims to either 1. Solve design challenges within the existing organizational framework or 2. Design a new frame around which a solution can be based. Dorst theorizes that in creating a new frame around which a problem and subsequent solution can be based that an organization is able to examine deeper themes which result in a more drastic transformation of organizational practices.

Finally, design thinkers should also try to embrace certain mindsets to fully embody the process. They should have empathy, integrative thinking, a sense of optimism and experimentalism, along with a strong collaboration mindset (Brown 2008, 87).

Keeping in mind these core ideas behind service dominant logic and design thinking, we move forward to the service design methodology that will be used as the driver of this thesis development project.

4.2 Service design processes and tools

"If you would ask ten people what service design is, you would end up with eleven different answers- at least." -Marc Stickdorn

There are many different applications of service design to problem-solving real-world challenges, and many different methods that can be followed. The development project for this thesis outlines one way that service design methods can be applied to problem-solving by providing a framework through which to explore the research questions and development of the feedback tool which fulfils the purpose and aim of this thesis project.

Similar to design thinking, there is a specific mindset that is required to properly approach a service design project. There are seven guiding principles embodying a service design mindset that should be followed when executing any service design project. According to Stickdorn et. al (2018, 27), a service design project should be:

1. Human-centered- consider the experience of all the people affected by the service.
2. Collaborative- Stakeholders of various backgrounds and functions should be actively engaged in the service design process.
3. Iterative- Service design is an exploratory, adaptive, and experimental approach, iterating towards implementation
4. Sequential- The service should be visualized and orchestrated as a sequence of interrelated actions.
5. Real- Needs should be researched in reality, ideas prototyped in reality, and intangible values evidenced as a physical or digital reality.
6. Holistic- Services should sustainably address the needs of all stakeholders through the entire service and across the business. (Stickdorn et. al 2018, 27)

There are many popular frameworks, but there is not one universal process for how to structure and run a service design project. For this development project, the double diamond service design process was chosen. These seven service design principles in a practical

framework are excellently embodied by the double diamond design process. Unveiled in 2004, the British Design Council's Double Diamond is one of the world's most visible and popular service design processes. There are four main phases in this process: Discover, Define, Develop, Deliver. This double diamond process is not meant to be strictly linear where you work start to finish, but iterative. As you gather more information and insights you are encouraged to keep iteration loops not only within phases, but across the entire process (Design Council 2019).

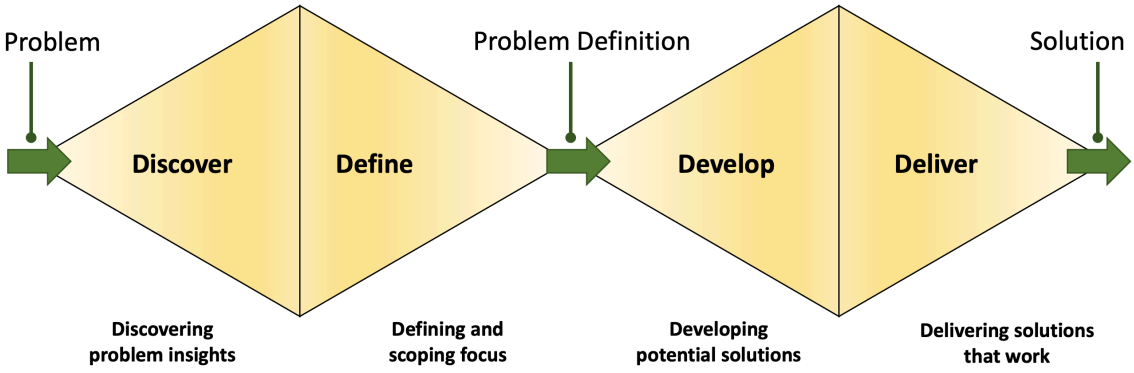

Figure 11: Adapted Double Diamond Design Process (British Design Council 2019)

The four phases of the double diamond are diverging and converging. In a diverging phase the goal is to gather as much information, insights, and possibilities as possible. In a converging phase, the goal is to analyze the information presented in the previous phase by narrowing and refining the discoveries, insights, and ideas (Nessler 2016).

Discover

The first part of the double diamond is the discovery phase where the design challenge (or brief) is initially presented. In this diverging phase the aim is to establish an understanding of the background information shaping the service to be created by studying the client company, the stakeholders and/or users, and context in which the service will be used (Miettinen and Koivisto 2009, 13). This phase is about gathering human insights to challenge assumptions and get fresh perspectives on what is the actual challenge to be solved (Design Council 2019).

Define

The next phase is the define phase. Although you are presented the initial challenge in the discover phase, after the first diverging phase of information gathering, the insights gathered should be used to challenge not only your assumptions but the initial design challenge itself. In this converging define phase you synthesize your insights, discover new opportunities, re-frame or shift the core design challenge if needed, and conclude with a final clarified design brief (Design Council 2019; Nessler 2016).

Develop

The third phase is another diverging phase. In the develop phase, after the design challenge is better defined, solutions can begin to be ideated, co-created, and prototyped by involving various stakeholders and users involved in the new service concept (Design Council 2019).

Deliver

In this final converging phase in the design process the goal is to deliver the final service concept. Prototypes continue to be tested and iterated until the final concept is fully designed and implemented (Design Council 2019).

Service Design Methods and Tools

Service design skews heavily towards qualitative research and development methods with some quantitative methods to verify findings and hypotheses. Quantitative research can tell us ***what*** is happening, but it is only through user-centered, qualitative research that we can uncover the ***why*** (Polaine, Løvlie and Reason 2013, 39). The service design methods and tools outlined in the following sections are qualitative research tools and methods that will be used in this development project, which are designed to dig deeper and gain insights on a human level from all stakeholders involved in the architectural design process.

4.2.1 Interviews

The purpose of interviews in the service design process is to gather feedback from various perspectives about a topic. The outcome of conducting interviews is that insights from different stakeholder perspectives can be gathered about experiences, processes, personal feelings, needs, wants, and more (Stickdorn et. al 2018, 34). According to Portigal (2013, 8), use of the interview as a tool to gain insights is not the best fit for every topic. He writes that the best application of interviews is in situations where one seeks to dig deeper into a topic as opposed to seeking “a source for statistically significant data”. Portigual (2013, 8) theorizes that because interviews are individual with an open structure that it can be difficult to

analyze and compare data in a sample set. However, once insights are gained, interviews can be a good place to gather insights to begin scoping a project (Marsh 2022,155).

The most important thing when starting to plan the interview process is to make sure that you have a clear objective or research question. To properly define this, it is important to know what the aim of your research is, and how you would like to use the insights gained in the next steps of your service design project (Portigal 2013, 30; Stickdorn et. al 2018, 36). It is equally important to make sure that after defining the research questions to be asked in the interview that you create criteria to filter and properly select interviewees who are able to offer relevant input and insights to your research questions through their interviews (Stickdorn et. al 2018, 36).

Another important step in preparing for a round of interviews is the preparation of a field guide. This is a crucial item to prepare because it ensures that you have a solid outline of what you hope to cover in an interview and that there is a plan to cover all necessary discussion points required to generate insights for your research questions and goals (Portigal 2013, 39).

When conducting an interview, it is vital that the interviewer does not influence the responses by asking leading questions or conducting an interview from the vantage point of being the authority on the topics under discussion. A good interviewer places the focus on the interviewee as the ultimate authority on the topic. By asking open ended questions, actively listening, being mindful of body language, and encouraging deeper conversations by keeping an open mind, one is able to get the most out of the interview process (Portigal 2013, 20-27; Stickdorn 2018, 36).

During the interview it is necessary to select a method for taking notes for analysis after the interview is complete. As the interviewer, you can take your own notes during the interview, have a research partner take notes, make video or audio recording, or a combination of these methods. It is important to note that permission should always be granted from the interviewee before making a video or audio recording of any interview (Marsh 2022,154). It is also useful after an interview has concluded to immediately take some time to write any final thoughts and reflections about the interview and things discussed while the information is still fresh in the mind of the interviewer (Portigal 2013, 116).

There are different methods of qualitative analysis used to synthesize insights from interviews. The method used in this development project will be detailed in chapter 5.1.2.

4.2.2 Workshop planning and facilitation

Since service design is a methodology created to bring people from different disciplines together, one of the most popular and effective tools that can be used in a service design

project is that of the workshop. There are many different types of workshops that can be designed: kick-off workshops, engagement (milestone) workshops, requirements gathering workshops, design and co-design workshops, and content workshops (Marsh 2022, 196-197). According to Polaine et. al (2013, 61), there are five steps to planning a workshop: recruiting, preparation of venue (or virtual space), schedule creation, workshop tool design, and documentation.

When planning a workshop, it is imperative to gather the proper participants to ensure quality results from the co-creative workshop efforts. If you gather people who have little knowledge of the topics of discussion, then the insights gathered will be based on assumptions and/or incorrect information (Stickdorn 2018, 52).

It should then be decided if the workshop will take place in person, or in a virtual space. The pro of using virtual spaces is that it allows you to bring together people who may not be in the same geographical location. The con is that there is an added challenge of making sure everyone knows how to use the technological platforms that will be utilized in the workshop. If the participants are unfamiliar with the platforms being used, then you can send them information prior to the workshop so they can familiarize themselves with the technology and/or designate time at the start of the workshop to ensure everyone is comfortable with the virtual tools. If the workshop is in a physical location, then be sure that it is the proper size to accommodate all of the participants and that all of the necessary tools are ready in advance. When making the schedule, the timetable presented should be realistic and show approximately when and for how long each activity will take place (Marsh 2022, 194-195; Polaine et.al 2013, 61).

When selecting the workshop activities, it is important to select activities that match the goal of the workshop objectives and are suitable for the number of participants available. It is also useful to document the workshop for later review. If the workshop is in a physical space, you can take photos of the activities and co-created work or make a video recording. If the workshop is in a virtual space you could also make a video recording of the session for later reference, and also refer to the information co-created created through the virtual platforms in the workshop exercises (Marsh 2022, 194-195; Polaine et. al 2013, 61).

When conducting service design workshops, the researcher takes on the role of the workshop facilitator. In a workshop setting a facilitator leads the group by keeping the timetables and planning the structure of the activities to guide a group towards a common goal. However, the job of the facilitator is not to directly participate in the activities but create the rules and foster a positive environment for the creative collaboration and participation in the workshop activities from the group. The facilitator’s job is to keep the overall agenda and individual tasks on track, guide discussions, encourage deeper thinking, direct the group through

conflict, provide feedback, take notes, and if necessary, assist the group in finding closure and identifying the next steps that need to occur after the completion of the workshop (Bens 2012, 7-8).

4.2.3 Service design methods used in development project workshops

The next section will give a brief description of some of the service design methods used in the workshops for the thesis development project.

Stakeholder maps

A stakeholder map is a visualization tool where the different stakeholders within an experience, service, or process are mapped. The aim is to answer the question "Who are the most important people and organizations involved in an experience?" (Stickdorn et. al 2018, 59) Stakeholder maps can be used as a tool to define the intent and set a context for a design project, begin to get to know the users, and frame insights (Curedale 2013, 235). The process of mapping stakeholders allows a designer to visualize the various groups that make up a service ecosystem or network and explore the connections and relationships between stakeholder groups. The stakeholders mapped could be end users, every group involved in a service, or a combination (Stickdorn et. al 2018, 59).

Personas

A persona is a profile or character that is drafted who represents a specific group of people. The persona created is fictional but based on facts gathered through research and actual knowledge rather than assumptions (Stickdorn et. al 2018, 40). Personas based on assumptions, stereotypes, or inaccurate information result in faulty insights that are not based in reality (Curedale 2013, 219). The purpose of personas are to assist in creating empathy and understanding for the archetype represented by the persona. Personas can be made in different ways, but typical personas will have an image, name, demographics, quote, mood images, and general description of the profile created (Stickdorn et. al 2018,41-42). Personas can be made individually by a design researcher or co-created in a group.

Problem Tree/Objective Tree

This exercise is created to visualize a problem or challenge by illustrating a core problem and the related hierarchy of root causes and effects. In a problem tree exercise, a core problem is written in the middle of a tree and the root causes are brainstormed and mapped at the base while the related effects are brainstormed and mapped at the top. These causes and effects can be arranged to show a hierarchy of issues, and it is encouraged to ask "Why?" to dig as deep as possible into the layers of causes and effects.

In the corresponding objective tree exercise, the core problem is flipped to a desired result, the root causes to enabling conditions, and the consequences/effects to positive outcomes. In flipping the negative core problem to a positive desired result, the purpose of the objective tree is not to find a solution, but to highlight the possible outputs, outcomes, and impacts of a development project formulated to address a chosen issue. This exercise is designed to visualize as extensively as possible the entirety of an issue, it's components, and visualization of positive outcomes (The European Commission 2011; Curedale 2013,72-75).

4.2.4 Prototypes

Prototypes can be used for different purposes in a design project. Stickdorn et. al (2018, 64) reports that "prototypes are prepared and used to explore, evaluate, and communicate service ideas during different activities within the service design process". They go further to state that the first step when creating a service prototype is to make sure that purpose of your prototype is clear and that you understand "why you are prototyping and what you want to achieve (Stickdorn et. al 2018, 212)". Just as seen in the design process as a whole, this prototyping phase should also be iterative and have clear goals, questions. The prototype design loop steps should include:

- Building or preparing a prototype
- Running the prototyping session
- A simple form of data synthesis and analysis (Stickdorn, et al 2018, 222)

When creating prototypes, it is important to keep in mind that what is being created is a concept to be tested and improved- not a final product. It is important to create prototypes to figure out what works and what should be improved, and it is better to find out what doesn't work earlier in the process through a rough low-fidelity prototype (2D sketches, maps, paper drafts, cardboard prototypes, etc.) than later with a higher fidelity (3D models & mock-ups, functional prototypes, etc.) more costly prototype. In the beginning it can be beneficial to start with a simple low-fidelity prototype and gradually move towards a high-fidelity prototype as you move through the prototype iteration loops towards the final concept. (Liedtka et. al 2011, 141; Stickdorn 2018, 220-221)

According to Polaine, Løvlie, and Reason (2013, 141-142), one method of prototype development and testing is delivered through a discussion prototype. They describe this method as being akin to interviewing and it is the lowest fidelity and cheapest testing option. In this discussion a low fidelity prototype mock-up is presented that allows the discussion participants to walk through the mock-up of the various service steps and give their immediate feedback and impressions of the service proposal. The goal of this discussion is to identify the clear

problem areas in the prototype in order to circumvent possible major issues in future iterations of the prototype concept. It is also used to gather feedback that will assist in future design iterations that consider user feedback for positive improvements. This type of prototype will be used in the development project and discussed further in chapters the next chapter.

5 The Development Project

In this chapter of the thesis report, the development project and each of the steps taken are described in detail.

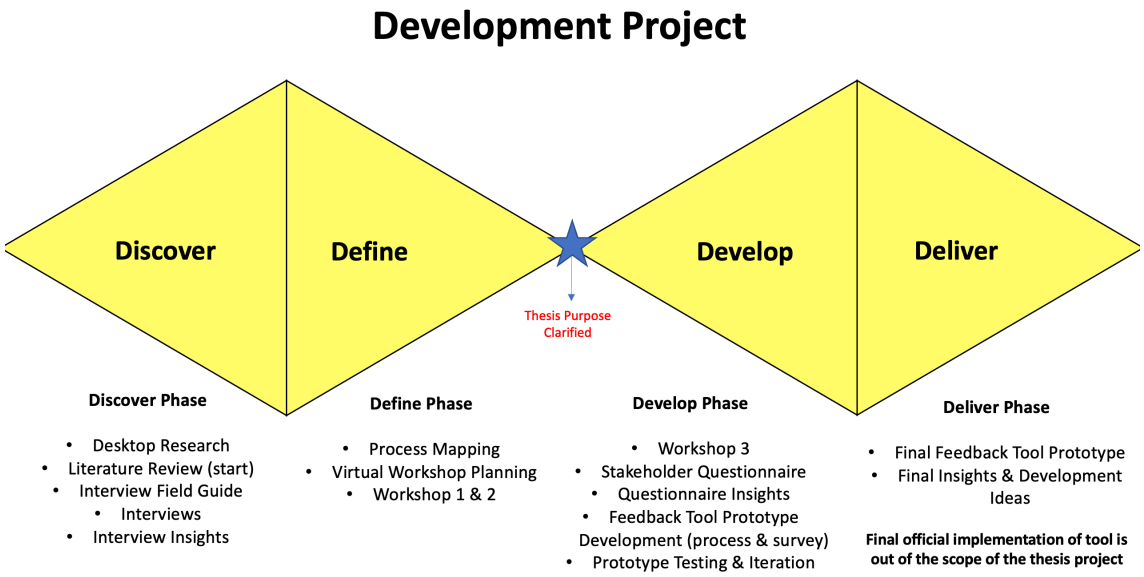

Figure 12: Double diamond visualizing development project steps

Figure 12 shows each of the steps taken in the development project through all of the service design phases.

5.1 Phase 1: Discovering the design challenge

To begin discover phase of this development project, my first step was preparatory research. Stickdorn et. al (2018, 15) describes preparatory research as “digging deeper into the client’s perspective of what the research problem is: context, perceptions, internal conflicts, or interplays that may emerge during the project, and so on”. To begin, I had a handful of informal discussions with the case company ShipPalette about potential topics of interest for a development project. In these discussions we sought to define a starting point and appropriate scope for the development work.

After our initial discussions, it was agreed that the aim of my thesis would be to identify the most typical challenges and consequences of those challenges related to stakeholder

collaboration in the cruise shipbuilding process. As the shipbuilding process is very long (on average 4-5 years), we agreed this project would focus specifically on the architectural design phase that covers roughly two years (or more). This project phase is also specific to the work ShipPalette currently specializes in for the management of cruise ship construction projects. It was additionally agreed that I should focus on the beginning of the architectural design phase to assess where the challenges lay for each of the main stakeholder groups (ship owner, architect, shipyard, and TK/outfitter) as they are individually introduced to a new project.

5.1.1 Discovery phase interviews

Based on this scope, I began planning the next part of the discovery phase: interviews. Stickdorn (2018, 100-101) describes two types of research: exploratory and confirmatory. Exploratory research seeks to gather more information about a topic without bringing any internal biases or assumptions to the research. Typically, this research is crafted to explore "Why" questions without explicitly stating a direct cause. Conversely, confirmatory research is designed to substantiate any hypotheses one may have through research. Moving into the interviews, I decided it was best to conduct the interviews through the lens of exploratory research on the topic as I wanted to start this project with an open mind without any assumptions as to what the issues may be.

Keeping in mind the different theories discussed in the theoretical framework for systems thinking, network management, organization theory, and knowledge sharing and management, I created a questionnaire aimed to gather data that would help me understand the strengths, challenges, and possible areas for improvement in processes and interactions between these stakeholder groups during the start of the architectural design phase. There were five main sections in the questionnaire that aimed to gather data from different stakeholder perspectives in the following areas:

1. How communication is established in a new build project
2. Official project kick-off experiences
3. General communication issues
4. Communication of project requirements and goals
5. Teamwork across stakeholder networks (see appendix. 1 for full questionnaire)

When I contacted people to ask if they wanted to participate in my study I asked if they preferred to fill in the attached questionnaire or have an interview instead and verbally discuss their thoughts. 100% of the respondents who agreed to participate elected to have an

interview, so the questionnaire was then used as a field guide for interviews (Appendix 1. Full Interview Field Guide). As previously mentioned in chapter 2, ShipPalette employs consultants who respectively have had decades of experience working for the main shipbuilding stakeholder groups before joining the ShipPalette team.

I began the interview process by first interviewing key people inside ShipPalette, and then broadened my interviews to include people representing the four main stakeholder groups (ship owner, shipyard, architect, TK/outfitter) from organizations outside of my company. With each interview lasting an average of 45 minutes- 1 hour each, I interviewed a total of 14 people. These interviews all took place virtually through Microsoft Teams. I was given permission to record these interviews by all participants and these recordings were used only by myself to replay and gather more insights. All interviews are anonymous and will be destroyed after the grading of this thesis paper. For the purpose of writing this thesis, the participants confirmed the researcher could use a job title and approximate years of experience in addition to the stakeholder group they represent to communicate in this report the relevant background information of the interviewees from which the subsequent insights were gathered.

Interviewee Stakeholder Group Affiliation	**Job Title**	**Approximate years of experience in shipbuilding projects**
Ship Owner	Senior Design Director	25 years
Ship Owner	Director, Architectural Design	40 years
Ship Owner	Director of Design Operations	2.5 years
Ship Owner	Manager, Architectural Design and Outfitting	17 years
Ship Owner/ Shipyard	Consultant/ Architectural Design Management	25 years
Shipyard	Team Leader	2 years
Shipyard	Interior Basic Design Technical Team Leader	25 years

Architect	Design Director	25 years
Architect	Architect Firm Partner	34 years
Architect	Principal	20 years
Architect	Interior Designer/Project Manager	10 years
TK/Outfitter	Purchaser, Technical Handler, and Logistics Specialist	22 years
TK/Outfitter	Project Manager	7 years
TK/Outfitter	Project Manager	13 years

Table 3: List of interview participants

5.1.2 Synthesizing interview insights

Mind mapping interviews is an alternative qualitative data analysis tool that can be useful when analyzing interview data. “Mind maps involve focusing on one main topic that branches out into nodes in a centre-out hierarchical structure (Fearnley 2022,6)”. Fearnley (2022, 17-18) theorizes that the traditional method of transcription and coding is only one of many methods that can be used to interpret qualitative data, and that by using mind mapping as the analysis tool the researcher is able to not only create codes but also draw connections that can reveal themes and patterns in the data and relationships between interviewees. The cons of this method are that it can be difficult for an outsider to interpret the mind map, and it does rely soley on the researcher to make the connections and codes in the information gathered (Fearnley 2022, 19). For use in this project, I thought that mind mapping the interview data would be a good way to see the connections of issues between the stakeholder groups to visualize what issues are connected, what issues are the same between stakeholders, and what issues may influence issues for other stakeholders. During the interviews I took notes, but also relied on the recordings to listen again multiple times to some interviews to dig deeper to uncover insights and make connections.

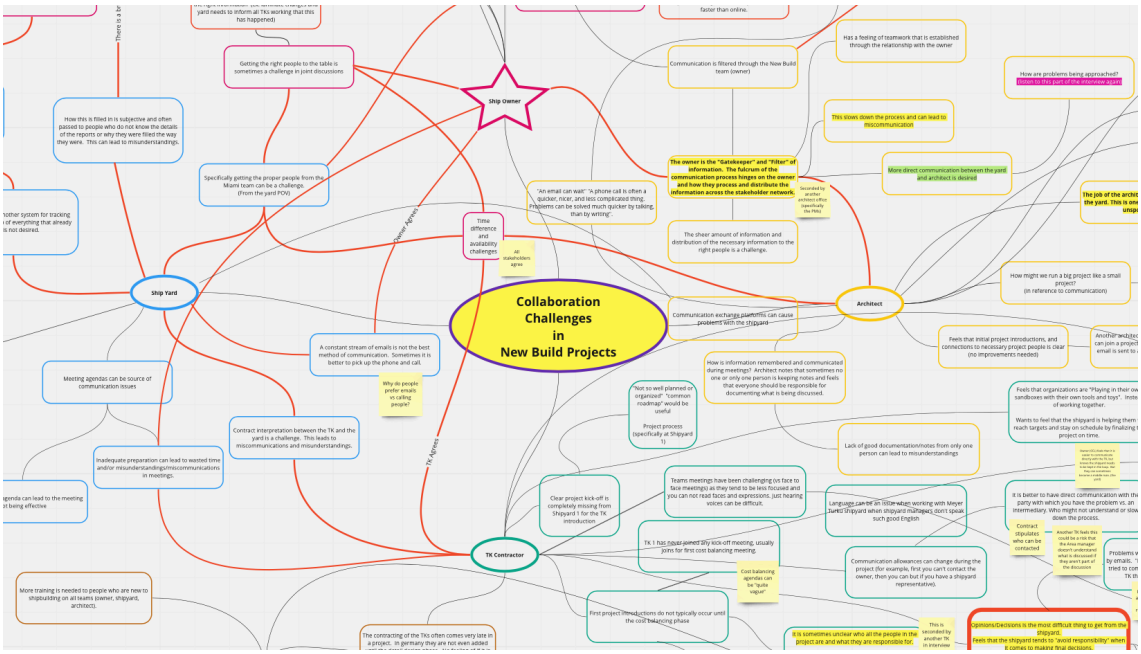

Figure 13: Interview Responses Mind Map (center view of mind map)

Miro was used to create the mind map used for analysis of the interview data. In the mind map, the challenge (topic that was being researched) was listed in the middle, and the stakeholder groups were listed around the topic in center, visualized with issues branching out and connecting and color coded by stakeholder group. After this was completed, the researcher grouped the most common issues by stakeholder group and highlighted the common issues reported by all four groups.

Figure 14: Diagram of issues by stakeholder group

It should be noted that the original field guide was seeking to pinpoint challenges at the beginning of the architectural design process when each stakeholder group joins a new project. I learned when interviewing people from various stakeholder groups that the shipbuilding process varies immensely depending on the shipyard or ship owner. Each stakeholder group and company join at different points in the process and this variation can be even more distinct depending on where and with whom the project is taking place. Due to this discovery, during the interviews there was more emphasis placed on discussing collaboration challenges that occur anytime in the architectural design phase (and not just at the beginning). The insights gathered from these interviews will be discussed in detail in the results chapter of the thesis report.

5.2 Phase 2: Defining the purpose

The next phase in the process was the **define** phase. After gathering the interview insights and seeing the wide range of challenges presented by stakeholders in the architectural design process, it was difficult to narrow down a tool that could be developed to address such a wide range of issues. I decided to hold a two-part workshop with the experts at ShipPalette to discuss these issues and, through a group of experts, define a specific area for improvement. The three senior advisors and CEO of ShipPalette who were previously interviewed would also participate in this workshop, so they had an understanding of the topic of discussion and many years of previous work experience doing projects for the different stakeholder groups and could view the issues from all perspectives. This was key because together as a group they possess a deep understanding of the challenges faced from the different stakeholder perspectives. The goal of these workshops was to dive deeper into the topic of collaboration challenges by exploring the issues from different stakeholder perspectives, gathering additional details, and brainstorming possible opportunity areas for development. Although everyone in the workshop was currently working for the same consulting company, the instructions were given was that each participant was to approach the workshop from the viewpoint of the respective stakeholder group from which they have a background and many years' experience working for. This way each stakeholder group was represented with one expert from each field.

Workshop Day 1

The workshops were held on two consecutive days with the first part being three hours and the second part being two hours. ShipPalette is currently based in Vantaa, Finland, but operates with a hybrid work model. After the COVID-19 pandemic, work is mainly done remotely by the employees. Because the employees of ShipPalette are located in different cities across Finland, it was necessary to have these workshops online. The workshop was designed and conducted using Google Jamboard and Microsoft Teams.

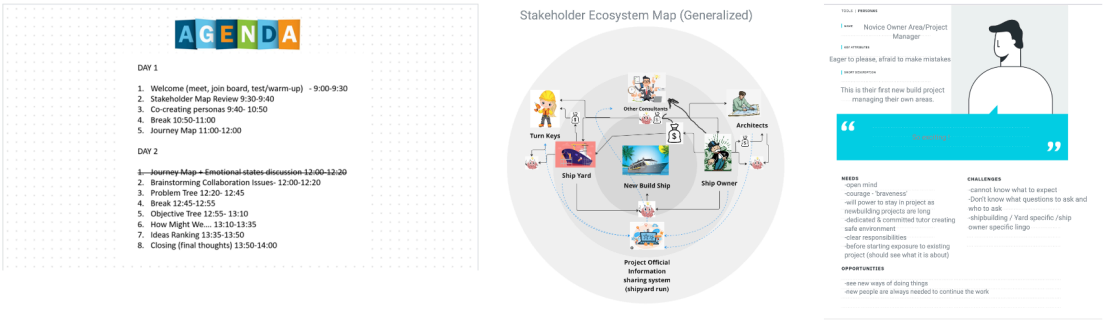

Figure 15: Google Jamboard workshop screenshots Day 1

In Day 1 of the workshop, we began with a short introduction to the day and fun brainstorming exercise to get everyone into the mindset of a collaborative workshop. The participants had participated in a previous workshop (not related to the thesis project) conducted through Google Jamboard and Microsoft Teams, so minimal refreshers to the platforms were needed before getting started.

In the first official exercise, the group reviewed an architectural design phase stakeholder map that I had created prior to the workshop. The group validated the stakeholder map by discussing and giving feedback about the various connections illustrated between stakeholder groups. The stakeholder map visualized the connections and highlighted the financial and information flow between groups. During the workshop I adjusted the stakeholder map based on group feedback. To begin to open feelings of empathy and look at the challenges from all stakeholder perspectives, we next had an empathy exercise by co-creating personas for different stakeholder groups in the architectural design process. The group created personas from the perspective of both an experienced and a novice worker from each stakeholder group. The goal was to step into their shoes by understanding what the challenges in the architectural design process would be not only across the stakeholder group, but also experience levels. In creating and discussing these personas the workshop participants were able to begin thinking of issues from all perspectives.

The next exercise was to work with a journey map. Typically, journey maps visualize the series of events experienced by one specific person (or stakeholder group) in relation to a service or process. A journey map can also have many different lanes of information (stages, steps, storyboards, channels, etc.) visualized. I was striving to find mutual pain points in a process that involved several groups working together simultaneously on different tasks towards a common goal. Due to the complexity of the architectural design process in question, I decided to draft a version of a journey map wherein solely the four phases of the architectural design process steps were outlined. Since the process steps vary depending on what shipyard and shipowner are running the project, a generalized view of the architectural

design process based on one existing method was created that listed the steps taken by each stakeholder group in each phase. This generalized overview of the overlapping processes visualized in a journey map was completed prior to the workshop based on information gathered from interviews, desktop research, and short inquiries to knowledgeable people.

Figure 16: Journey map from workshop day 1

In the workshop this journey map was presented, and then each of the four workshop participants who had experience working for the stakeholder groups took time to review the steps listed for their respective stakeholder group and make adjustments to what they felt was incorrect. After this, we came together to discuss this process and the steps taken by each stakeholder group during the architectural design phase. By overlaying the process with the steps taken in each phase by different stakeholder groups, the goal was to find areas where all four stakeholders being examined had a common or interconnected problem that could be addressed. The last exercise planned for the first day was to take time for each stakeholder group representative to add emojis to visualize the emotional journeys in the process for each group. Due to lack of time, the researcher facilitated a shorter discussion where the emotional states for the various steps in the process were reviewed verbally as a group. After this discussion the first day of the workshop was concluded.

Workshop Day 2

The second day of the workshop was held on the next day. The workshop started with a short review of the journey map discussed the previous day. Then I led the group in a

brainstorming session with the theme “What are the most typical challenges during the architectural design process when it comes to collaborating with other stakeholders in the project?”. Many challenges were presented and discussed together. The next exercise was the problem tree and objective tree. To begin, the researcher asked each workshop participant to take the challenge they thought was most interesting to them as something that could be investigated further. After a discussion to make sure there were no overlapping topics selected, they moved forward to the problem tree exercise. The four problems that the participants selected as individual topics for further exploration were:

- Inadequate or lack of tutoring/training (for new companies or new people within organizations)
- Lack of understanding the importance of process flow and agreements in different phases
- Lack of knowledge of shipbuilding rules and regulations (in reference to new companies)
- No synchronized, feasible schedule allowing working time for all parties

In this exercise they were all given individual time to take the problem they selected and break the issue down further to explore root causes and the consequences/effects of the core problem. After this, each workshop participant presented their problem tree and we discussed as a group their findings and added to the trees if the group felt anything was missing or needed adjustment based on other perspectives.

For the next exercise, the objective trees were created to reframe the core problems into desired results. Each of the workshop participants were given a copy of their problem tree and were given individual work time to flip the core problem to a desired result, the root causes to enabling conditions, and the consequences/effects to positive outcomes. As discussed in the methodology section of this report, in flipping the negative core problem to a positive desired result, the purpose of the objective tree is not to find a solution, but to highlight the possible outputs, outcomes, and impacts of a development project formulated to address the chosen issue.

When flipping the perspective of the trees, I asked the participants to highlight any problem root causes they felt were so complex they could not be changed (for example, creating a schedule for a project of this size is difficult no matter what changes you propose) and any consequences/effects they felt could not be changed because it is out of the control of the updated desired result (for example, giving adequate training can reduce but not erase the possibility of future mistakes). The purpose of this was to spark a deeper conversation to

challenge assumptions or validate feelings when discussing the objective trees insights. After the objective trees were created individually, time was spent as a group discussing each new tree and adding thoughts and feedback from other perspectives.

The last exercise was “How Might We?”. For this exercise, the group reviewed the opportunity trees to consider not just the core issue/opportunities, but also the smaller issues/opportunities that were discovered and used this information to brainstorm ideas that could resolve or alleviate any of the issues previously discussed. This idea would be the basis for the tool that would be developed. The researcher then asked the participants to vote for their favorite two or three ideas. The next exercise would have been to rank the ideas in a portfolio that measured desirability and feasibility, but the researcher again ran out of time on the second day of the workshop. The researcher felt that, due to the broad scope of the ideas discussed, it was overly optimistic to pick a final topic to move forward with in the time frame presented for the second workshop day.

Informal Follow-Up Discussion

There was an informal discussion held after the workshop two days later with the participants. In this discussion, the opportunity topics for the development of a tool were revisited. After having time to let the ideas sink in, the researcher discussed a few potential development ideas based on the conclusions from the workshops. During this discussion, the challenges in collaboration and knowledge flow between stakeholder groups (and within their individual organizations) was revisited as a general area for improvement. As a group, it was felt that the challenges in knowledge flow between stakeholder groups was a deeper root cause of many of the collaboration issues discussed in the workshop. I then inquired about existing feedback processes and how the knowledge gathered from stakeholder feedback is used to improve collaborative processes.

It was in this discussion that it was discovered there is no official standardized feedback process involving all stakeholder groups specifically in regard to the architectural design phase under review in this thesis project. It was thought that depending on the project, although there are feedback processes, they are generally between only two stakeholder groups at a time, and the agenda and objectives for the feedback processes were varied. It was agreed that developing a proposal for a standard feedback process and template related to the architectural design phase would be a useful tool to bring the stakeholder groups together to discuss the collaboration challenges they repeatedly encounter during this process and assist them in working together towards future solutions.

5.3 Phase 3 & 4: Developing the tool and delivering the final prototype

Based on the conclusion of the define phase, there was now a clear area of opportunity for development of a tool. The purpose of this thesis is to design a tool to be used as a starting point template for feedback processes between stakeholders to improve the cruise shipbuilding architectural design process. The next section will discuss the prototype development and testing for the feedback process tool to be developed.

5.3.1 Prototype Workshop

One final workshop was conducted with ShipPalette to ideate details that should be considered when designing the feedback prototype. This two-hour workshop was also conducted online using Google Jamboard and Microsoft Teams. The agenda for this workshop that was presented with the aim to answer the following questions:

1. Who is the feedback for?
2. What are the research questions? (Themes that would be broken down into smaller question segments)
3. What could be done with the feedback? (How could it be used?)
4. Who would gather/analyze the data? How would this be done?
5. Where in the process would this feedback occur for each stakeholder group? (one time or multiple time thing?)

Figure 17: Google Jamboard workshop 3 screenshots

This workshop helped to define some parameters and a starting point for the development of the prototype for the feedback tool. We started by brainstorming who would be in charge of this feedback process that was to involve all stakeholders. It was decided that since the shipyard is the stakeholder that is typically responsible for defining and managing the shared master schedule during these architect design phases, that they should also be the ones to lead the feedback process. It is from the perspective of the shipyard as the leader and organizer of this process that I would develop the feedback tool.

Next, we discussed what the purpose of this tool could be by brainstorming how could it help improve the architectural design process, and how the knowledge and insights gathered from the feedback could be used. In the final part of the workshop, we revisited the architectural design phase journey map that was validated in the previous workshop to draft a proposal for how and when the feedback process could fit in the schedule. Finally, we quickly outlined a preliminary proposal for what the feedback process could look like from the shipyard's point of view.

5.3.2 Prototype Questionnaire

After the workshop, I set out to gather additional feedback from stakeholders outside of ShipPalette to validate our findings and to get a broader range of feedback as to what other organizations felt would be important to discuss in a feedback process at the end of the architectural design phase. The existing feedback sessions have sometimes been referred to as "Lessons Learned" meetings depending on who has organized the sessions.

I sent the following questions to all stakeholder groups for feedback based on insights from workshop for further validation and exploration:

1. Are you typically part of an official feedback or "lessons learned" discussion at the end of your involvement in a project (or any other point in a project life cycle)? Yes or no?
    a. If so, who led it? (You do not need to list a specific company, but what stakeholder group(s): ship owner, shipyard, TK/outfitter, architect office, consultant group, other?)
    b. Were there any additional stakeholders involved in this feedback process besides the group that led the feedback process?
    c. In what format did this feedback process occur? (questionnaire, open ended questions in written format, one-on-one discussion, group discussion, something else?)
    d. When in your project lifecycle did it occur? Only at the end if your involvement or at multiple points in the process?

e. Were there any projects where you were **not** given project/performance feedback **in an official and structured manner**? Yes or no?

f. Were there any projects where you were **not** asked for your feedback and thoughts **in an official and structured manner**? Yes or no?

2. What topics do you think are important to discuss in an official feedback or "lessons learned" discussion **that would occur at the end of the architectural Detail Design ("CM/Local phase") when the architectural design intent is agreed between ship owner and shipyard?**

a. What specific stakeholder groups and/or specific positions within that group (i.e. project manager, area manager, etc.) do you feel for you would be important to be involved?

b. Is there any specific stakeholder group that you would like to give feedback to (or receive feedback from) and generally what topics do you wish to discuss? (for example, as a TK/outfitter I would really like to discuss ____ with architects)

3. Open comment: Is there anything you wish to comment about feedback or "lessons learned" discussions for new build projects in general?

This questionnaire was sent to fourteen different stakeholder representatives who were selected because they possess relevant knowledge of the topic in question. The researcher received feedback from seven. Of the seven responses received, three were from people with work experience on the ship owner's side, two from the turnkey/outfitter perspective, one from a shipyard perspective, and one from an architect's perspective. Based on their feedback I was able to gain the following insights outlined in table 4 below:

Questions sent to all respondents	Insights gained
1. Are you typically part of an official feedback or "lessons learned" discussion at the end of your involvement in a project (or any other point in a project life cycle)?	1. Every respondent has been part of projects where there was no official feedback process. 2. These discussions (when they have occurred) have been led by different stakeholders (sometimes ship owner, sometimes shipyard, sometimes even arranged by TK/outfitter), and were typically only between two stakeholder groups (not everyone involved in the process).

	3. These discussions have occurred at different phases in a project lifecycle. Sometimes lessons learned is not discussed until the end of a project, sometimes lessons learned at the end of a project are not discussed until the start of a new project, and other times this feedback discussion occurs at different points in the project lifecycle (relevant to the discussion being had). 4. The existing feedback processes that they have participated in have had different discussion targets depending on who was leading it (design reviews, contract reviews, general discussion of things that went wrong, financial reviews, etc.). **5. <u>Generally, there is no official protocol to discuss the lessons learned related to the architectural design process involving all stakeholder groups.</u>**
1. What topics do you think are important to discuss in an official feedback or "lessons learned" discussion that would occur at the end of the architectural Detail Design ("CM/Local phase") when the architectural design intent is agreed between ship owner and shipyard?	1. General discussion of items to be improved. 2. General discussion about how to improve visibility and alignment of actions and processes from all stakeholder perspectives. 3. Open/unclarified items from the end of the architectural design phase that need to be agreed moving into the next phase of the shipbuilding project.

	This question was not answered by all respondents. However, all respondents agreed that a joint feedback protocol would be very helpful (see quotes in section below).
4. Open comment: Is there anything you wish to comment about feedback or "lessons learned" discussions for new build projects in general?	"In general, there's not enough good discussion. Occasionally it would be good to do it in a forum with all the partners including: Project Managers, Operations Teams, Shipyard, Turn-key Partners and Design Team. I'm always surprised how much of the same frustration is shared amongst all the players; however, we all still spend most of our time blaming one another." "Typically, everyone is in so much rush that these type of feedback [sessions] get left behind even though they are very good." "I would like to discuss with all the stakeholder groups how to improve the visibility and alignment." "[In response to the proposal of having a meeting with all stakeholders present, these feedback sessions should include…]…all groups but not in the same meeting, and it is very important that there is some filtering/validation of comments done before those are put forward." "Not an easy task to reach honest open discussion between stakeholders (ship owner, yard, outfitter, architects). Everyone sees the situation only based on their own involvement and/or standpoint. All do not have the knowledge of the big picture, or of

	the complete design, building, and decision-making process." "…one of the most important things is communication… communication is not something that can be changed with any kind of process, management or anything like that, it´s the people. The people are the ones that do or do not have this ability or [wish] or feelings to communicate with each other." "Open discussion after architectural [design] phase would be fully appreciated. Feedback given and received are both very welcome."

Table 4: Feedback protocol current status questionnaire insights

5.3.3 Prototype Design and Testing

Prototype Design

After considering the insights from both the prototype workshop and survey responses, it was decided that creating a proposal for a tool that could be used for an official feedback protocol between stakeholders would best be tested by presenting a prototype for both the method and process through which this event should occur. As discussed in the organization theory section of this report, the three diagnostic data collection methods relevant to this development project that can be used when evaluating issues within organizations are questionnaires, interviews, and workshops/group discussions (Harris 2005, 21-22).

The first data collection method suggested by Harris is the questionnaire. The feedback tool template to be designed would be in the form of a questionnaire/survey. Although there are slight differences, the term questionnaire and survey are often used interchangeably in literature. There is an entire academic area of study encompassing surveys and questionnaires within the realm of survey methodology. A survey can be defined as "an instrument or tool used for data collection that is composed of a series of questions (Robinson and Leonard 2019, 1)".

There are two main question types that are administered in a survey or questionnaire: open or closed. Viten (1995, 27) describes an ***open question*** as a "free answer, free response, write-in, or unrestricted" question type where a respondent is given a general topic and

allowed to answer freely. A ***closed question*** as a "pre-coded, check answer, restricted" question type where respondents are provided a selection of answers and required to select the answer closest to what they feel is correct. According to Viten (1995, 27), there are pros and cons to these two lines of questioning. While open questions allow respondents to answer in their own words and provide a platform to offer deeper insights that could be used to validate or disprove hypotheses, it is a tedious task (both in terms of data collection and analysis) that can require a high time and financial commitment from the organization conducting the survey. It can also be more intimidating to the respondent as they need to think more to provide an adequate answer to an open question.

On the contrary, Viten (1995, 27) reports that closed questions surveys or questionnaires are cheaper alternatives which are easy to prepare, answer, analyze, and are able to provide clear comparisons in responses. Additionally, the interviewer does not require a high level of training. Disadvantages to this method are that there may be a bias in the formatting of the answers (and thus the results), the survey may be too simple, and the respondents are not able to give more detailed feedback which may irritate some. Debates over the uses and insights gained from the usage of open vs closed question types have arguments rooted in the already existing quantitative versus qualitative data debate.

Quantitative surveys (or questionnaires) consist of mainly close-ended questions sent to a large number of people to gather large data sets that can be analyzed to obtain statistical insights (Portigal 2013, 8). To create a tool that could generate insights deep enough to meaningfully improve stakeholder collaborations during the architectural design phase, it would be most beneficial for the diagnosis of specific collaboration problems and effective knowledge sharing through this feedback process to design a prototype using qualitative survey methods.

For qualitative surveys, Jansen (2010) suggests that there are two types of survey methods: open and pre-structured. In open surveys, which he describes as inductive, insights relating to topics are derived through the analysis of raw data sets. Pre-structured surveys are designed to have the main topics in question pre-defined and the method of collection for this information additionally predetermined. For this prototype the goal is to produce a pre-structured survey with clear objectives and a process for which the data collection will occur within the stakeholder network.

Robinson and Leonard (2019, 12-21) propose that effective survey design is deeply rooted in design thinking. They theorize that to design the optimal survey, one should apply the iterative principles of design thinking in four phases of survey design: empathize, understand, brainstorm, prototype, and test. Designing the prototype, I followed the survey design methodology outlined by Robinson and Leonard (2019, 20-21) outlined in table 5 below:

Phases of survey design (by Robinson and Leonard 2019)	Survey design applied to design of prototype for feedback tool
Planning and predrafting	**Planning and predrafting**
A. Determining and articulating survey purpose	Feedback tool purpose was co-created in prototype workshop.
B. Understanding what the survey can measure	Preliminary discussion of what the feedback tool could measure was hypothesized and defined in prototype workshop.
C. Understanding survey respondents	Work in the previous development project phases in addition to the survey sent before prototype development began provided a baseline of understanding of the respondents.
Developing questions	**Developing questions**
A. Sourcing questions	Insights from the prototype workshop, current state feedback survey responses, information gathered from the develop phase interviews and research into existing feedback processes provided the basis for the first round of prototype questions.
B. Crafting question stems and response options	Questions were formulated and written following the guidelines found in the survey methodology text and iterated based on feedback during testing.
Finalizing	**Finalizing**
A. Pretesting	Prototype testing and iterations were done with experts inside ShipPalette, and with one stakeholder outside the organization.
B. Preparing for administration, analysis, and use	Outside of the scope of the thesis development project.

Table 5: Adapted from Robinson and Leonard (2019, 20-22) and applied to feedback prototype survey design in thesis project

There is a very close association between the methodologies of survey design and development of an interview field guide. With the interview field guide, although it is used to steer the topics of discussion, in an interview setting a researcher can ask a series of follow-up questions to clarify any question related misunderstandings or misinterpretations whereas in a questionnaire or survey the questions must be precisely crafted to ensure the desired feedback is received. Additionally, throughout an interview process a researcher can make updates to the field guide or line of questioning in subsequent interviews if something is not working. This does not work in a survey setting where the questions must be clear and final at the time of distribution.

The stages of the feedback process for were divided into three main steps utilizing three of the four the organizational diagnostic criteria discussed in the theoretical framework: survey, interview, group discussion.

Figure 18: Stages of feedback process

Due to the complexity of the stakeholder networks and the nature of the shipbuilding projects themselves, to design a tool that would truly bring together the stakeholders in a way to productively give feedback and share knowledge that will lead to insights for future process improvements, I designed a process that would allow for feedback to be first generated, then discussed and validated or clarified through the checks and balances of the existing network structures, and finally compiled for a group discussion between stakeholders.

The entire feedback process starting with the survey distribution, through the interviews and insight gathering, into the final joint group discussion and was illustrated through the creation of a process map. A digital prototype for the feedback service process was visualized using

Miro. This feedback process was designed based on ideas from the initial survey workshop combined with feedback from the existing process survey responses and wishes of the stakeholders. The visualization of the specific steps in the proposed feedback process illustrated in Miro was presented in tandem with the survey tool to generate a holistic view of the proposed process.

Prototype Testing

The two main goals in the prototype testing phase were to get feedback about the survey and about the process proposal. Robinson and Leonard (2019, 162) emphasize the importance of running trial tests of the questions that comprise a survey to ensure that they are clearly formulated and interpreted by the respondents in the way that the researcher intended so that the information gathered leads to useful insights. Although the testers would not be filling in answers to the survey, they would be able to comment on the survey clarity and give other thoughts and opinions about the question syntax, categories and themes.

The feedback prototype (process and survey) was presented individually to each of the senior advisors and CEO of ShipPalette and one architect from an outside stakeholder company for feedback. All four rounds of prototype testing were done online through Microsoft Teams. These testing sessions were not recorded, but notes were taken during the process, so all feedback was documented for later analysis. I first presented the concept of the feedback process via the Miro board and collected feedback about the process proposal. Then the survey prototype was presented. Within the survey, the general topics for feedback and specific questions were discussed in detail.

Based on the feedback, the survey process and template were adjusted and prepared for final presentation. The final prototype process and survey, along with the testing feedback, and final discussion will be presented in the conclusion chapter of this thesis.

6 Results

In this results chapter of this paper, I will answer the original research questions presented in the introduction of this thesis along with the corresponding theoretical knowledge supporting these findings. The original research questions were the following:

1. What are the collaboration challenges that affect all stakeholder groups in the architectural design process?

2. What are some of the phenomena causing the collaboration challenges between stakeholders?

3. What could improve the collaboration process between stakeholders?

4. What challenge areas could be discussed in an official feedback process to improve future projects?

The first research question was explored in depth during the discover phase of the development project. The discover phase initial interviews were conducted in an exploratory manner to gather as many different viewpoints as possible into perceived challenges of each stakeholder group. Based on the analysis of all responses I was able to first see what issues affected individual groups, but ultimately what issues were commonly reported across all groups. Below I will outline the issues that were collectively reported by at least one or more people in all stakeholder groups. The effects of these challenges were discussed during the initial interviews and also explored during the workshops in the define and develop phases of the development project.

Research question #1: What are the collaboration challenges that affect all stakeholder groups in the architectural design process?

Issue	Description	Effects
Schedule visibility and misalignments	Schedule road mapping and alignment was reported as an issue. It is felt that the architectural design schedule is not always fully respected or kept (for various reasons), and that project goals and milestones could be better communicated.	• Misalignments and delays in schedules across all groups can trigger financial consequences within a project. • Lack of schedule alignment can cause confusion as stakeholders do not fully understand how and when their project deliverables affect the working times of other stakeholders. • When there are delays or major changes that come too late, it cuts into

		the working times of others, which can ultimately impact output quality in future phases where working time has been lost. • Consistent failure to meet schedule targets can cause feelings of frustration, distrust, and animosity between stakeholder groups.
Key decision-making delays	Decision making was reported as a problem either in making internal decisions in a timely fashion, or in getting key decisions from other stakeholder groups in a timely manner.	• Delays in decisions cause a subsequent delay in working times for affected parties. • These delays can have financial impacts and/or affect the quality of the project moving forward. • This causes frustration, stress, and tension between stakeholder groups when work is delayed because of forces outside their control stemming from delays from other stakeholder groups.

The "middle-man" syndrome	This syndrome was nicknamed by me to describe the phenomena that occurs when, due to contractual reasons, important information is filtered between stakeholders from one party to another through a third party sometimes resulting in negative outcomes.	• Misunderstandings can occur when the person filtering information does not fully understand the technicalities of what is being discussed and passes distorted or incorrect information from one party to another. • Major delays can occur when the person filtering information between parties becomes a blockage of information flow due to slow responses (or no responses) between parties.
Email Communications	As shipbuilding is a global project that relies heavily on virtual communication, while convenient, emails are often a source of frustration.	• The sheer amount of emails sent between stakeholders to key project people can be overwhelming to process, therefore a constant stream of information transmitted via email is not always the optimal way to communicate or request information. • Emails that flow through improper

		communication protocols can cause friction in stakeholder relationships (internally and externally in organizations) • The act of forwarding emails with project related inquiries between stakeholder groups without proper follow-up is often seen as not taking responsibility for finding and providing required feedback to external stakeholders.
Global availability of stakeholder groups	Due to the project being a global endeavor, there is always a challenge related to collaboration across many time zones.	• Internal resources (people/time) are often stretched thin and it can be difficult to schedule meetings where all necessary people are present.
Bringing the required people together	Getting the right people to the table and sharing information to the proper people is often a challenge.	• This can cause a delay in decision-making or getting vital information from the proper sources in a timely fashion. • These delays can cause subsequent delays in project

		schedules, cut into stakeholder working times, have financial delays, and/or increase negative feelings between stakeholder groups.
Lack of proper training	More training is needed for new people (either new hires, or new people joining at different project phases) to understand the current status of the project, processes, and responsibilities.	• More mistakes occur due to lack of vital knowledge being passed to necessary people. • Delays in processes or schedule can occur if work is late which can have financial or quality impacts. • Lack of proper training leads to a bad work environment and work inefficiency triggered by stress, conflict, and confusion internally and externally because of knowledge gaps.

Table 6: Answers to research question #1

Research question #2: What are some of the phenomena causing the collaboration challenges between stakeholders?

One of the greatest challenges when collaborating on projects such as these is the very nature of the systems and networks in place. During the architectural design process for these new build projects, although the various stakeholders may have differing agendas, they are all ultimately working towards the common goal of the successful completion of a new vessel.

In these multidisciplinary projects, the different network organizations function together as a team to achieve this goal.

As quoted by one of the interview respondents: “Communication protocols conflict with teambuilding. They separate the teams instead of uniting them.” In this quote communication can refer to literal communication methods and channels, but also the processes and practices of knowledge management and sharing between stakeholders within the network. In the theoretical framework, systems thinking, network theory, organizational theory, and knowledge management provide deeper insights into the core issue of the systems in place. When applying systems thinking to developing a deeper understanding of the stakeholder network, we see disruptions in the flow of knowledge between organizations in the form of organizational and network silos and bureaucracy. This phenomena as a barrier to collaboration was also mentioned by many of the respondents in the interviews during the development project.

Due to the temporary nature of these shipbuilding organizational networks, it is possible that after any given new vessel is designed and constructed, the network is dissolved and on the next project the stakeholders could be working for the competitors of their previous partners. Because of this, there is a fine line between the need for openness of communication collaboration and also a need to maintain secrecy over many information and knowledge areas as to not lose competitive advantages in future endeavors. These barriers have an impact on the processes and quality of collaborative efforts between stakeholders and overall density of the shipbuilding network.

There can additionally be found an imbalance of power between the stakeholders in the network organizations. Because all of the stakeholders in the shipbuilding network do not have the same authority in the project, there is an imbalance in the power distribution, decision making authority, and overall view of the larger picture in the shipbuilding process. The ship owner hires the shipyard to build a new vessel, and the ship owner and shipyard respectively hire additional companies to form the stakeholder network for the new build project. With the ship owner as the buyer of the project, they ultimately have the final say in the majority of the significant decisions that will be made over the course of the architectural design phase. However, the shipyard exclusively possesses the knowledge and networks to build the designs proposed by the ship owner. The remaining stakeholders in the network report directly to either the ship owner or the shipyard. There exists a hierarchy within the shipbuilding network, therefore the relational effects of this hierarchical stakeholder landscape can additionally be felt in the collaborative processes and quality between stakeholder groups.

Shortcomings in knowledge management and sharing between stakeholder groups is another phenomenon which can result in collaboration challenges. Meriam-Webster Dictionary (2023)

defines collaboration as the ability “to work jointly with others or together especially in an intellectual endeavor”. I will argue that an intellectual endeavor can be considered an exchange of knowledge and skills. Therefore, to successfully collaborate with others there needs to be a strong foundation for knowledge sharing between stakeholder groups.

Throughout these projects tacit and explicit knowledge is managed, filtered, and shared both through physical knowledge-based IT systems, and also through the communication protocols and interactions between organizations. While the current systems and processes obviously do work, there is always room for improvement so that knowledge management and sharing between stakeholder groups can be optimized. The IT systems represent solid vehicles and processes for explicit knowledge management and sharing. While these systems can always be improved, there should be a stronger focus on how to improve the spread of the tacit knowledge base throughout the stakeholder networks. The current lack of a cohesive feedback protocol in regard to the architectural design process is a shortcoming in the management and sharing of tacit knowledge between stakeholders that could be used to improve future collaborative processes. Without a feedback system in place, some of the same collaborative challenges are repeated project after project which leads to inefficient project practices and can have negative outcomes on stakeholder relationships.

Finally, another challenge in stakeholder collaboration is caused because in these global stakeholder networks much of the communication and collaboration in these projects is conducted in a virtual environment. Though people high up in the network organizations do regularly meet face-to-face, many of the collaborations between stakeholder groups on a lower level is done virtually. As the architectural design of vessels is slowly moving from 2D models to 3D BIM modeling, in the future even more of these collaborations will be held in virtual spaces through technological tools and platforms. Challenges caused by heavy collaboration in a virtual environment are manifested through misunderstandings because of communication through virtual platforms, language issues, and cultural differences expressed while operating in a virtual space.

Research question #3: What could improve the collaboration process between stakeholders?

A feedback tool, such as the one designed in the development project for this thesis could greatly improve collaboration processes between stakeholders. As reported by many of the stakeholders during the interviews and in the workshops during this development project, many of the collaboration challenges faced between stakeholder groups are not isolated incidents. Although each new build project features a stakeholder network comprised of slightly different organizations, there are specific collaboration challenges which are not currently being addressed that carry over from project to project.

Before any meaningful steps can be taken to improve the current collaborative processes between stakeholders, it is imperative that an understanding of what these challenges are is clearly presented and based on factual information. In order to gather the knowledge base needed to fully understand the thoughts, experiences, and feelings of those within the stakeholder network, a feedback process of some kind must occur. In the absence of any structured feedback protocol, only assumptions can be made as to what challenges were faced by network partners over the course of a project and these assumptions may or may not be accurate, correctly understood, or fully articulated.

The creation of joint feedback protocols across the stakeholder network to explore collaboration challenges creates a bridge in the communication channels between stakeholders allowing relevant tacit knowledge related to the selected feedback topics to flow through all organizations within the network and later influence adjustments to processes which will improve future collaborations. In the theoretical framework we explored the factors required for effective knowledge sharing in organizations. A joint feedback protocol enhances the knowledge sharing capabilities of these networks as there is currently a gap in the opportunities to share area. Lack of structured feedback protocols in regard to the architectural design phase processes represents a hole in knowledge sharing capabilities of these networks that can have negative impact on the ability of these organizations to respond and adapt to repeated challenges occurring between stakeholder groups. Over time this can have negative outcomes in productivity, overall stakeholder relationship quality, and willingness to cooperate in future projects.

Research question #4: What challenge areas in the architectural design process could be discussed in an official feedback process to improve future projects?

In research question one, I outlined the common collaboration challenges reported by stakeholder groups during my interviews. While those challenges highlight the major shared challenges uncovered during my interviews, it is by no means the definitive list of challenges. The challenges outlined in research question one are not the most effective topics to discuss in a joint feedback session between all stakeholders with the aim to improve collaborative processes in the architectural design phase. Some of the challenges reported in research question one have their roots within individual organizations and must first be addressed internally before broaching conversations with external stakeholders.

For the purpose of developing the feedback tool, it is necessary to pinpoint the relevant areas that should be jointly discussed to maximize knowledge sharing and improve future stakeholder collaborations. Taking a deeper dive into the initial interviews, the workshop insights, and information from the last round of surveys, the following items were pinpointed as areas

in the architectural design phase that should be explored in an official feedback protocol between all stakeholder groups:

- Introduction of project teams and processes
- Contract specifications and appendices
- Architect design schedule
- Communication, collaboration, and teamwork practices and processes
- Cost complexity process (where the final cost and designs are negotiated and agreed to fit existing budgets)
- Agreed final architect design material packages
- Open category (to report project process specific issues not belonging to one of the categories above)

These seven areas were used to guide the themes in the final feedback template that was developed and will be fully presented in the final feedback template in the following chapter.

7 Conclusions and Discussion

In this final chapter of the thesis, the final version of the feedback tool is presented. The final feedback process and template along with a summary of feedback from the prototype testing will be outlined. This thesis report will close with the discussion which contains my final thoughts, reflections, and recommendations for next steps.

7.1 Presentation of final feedback process and survey template

Final Feedback Process

As discussed in chapter 5.3.3, the final feedback process is designed so that the feedback flows through the channels of the stakeholder network in such a way that the system of checks and balances between stakeholder groups is maintained. The feedback is gathered, analyzed, discussed, validated and/or clarified between directly connected organizations in the network before being presented for discussion to the stakeholder network as a whole. For a refresher of the current stakeholder network connections, please refer to figure 6 in chapter 3.2.1. The feedback process is illustrated in figure 19 below:

Lessons learned feedback protocol for improvements to architectural design process

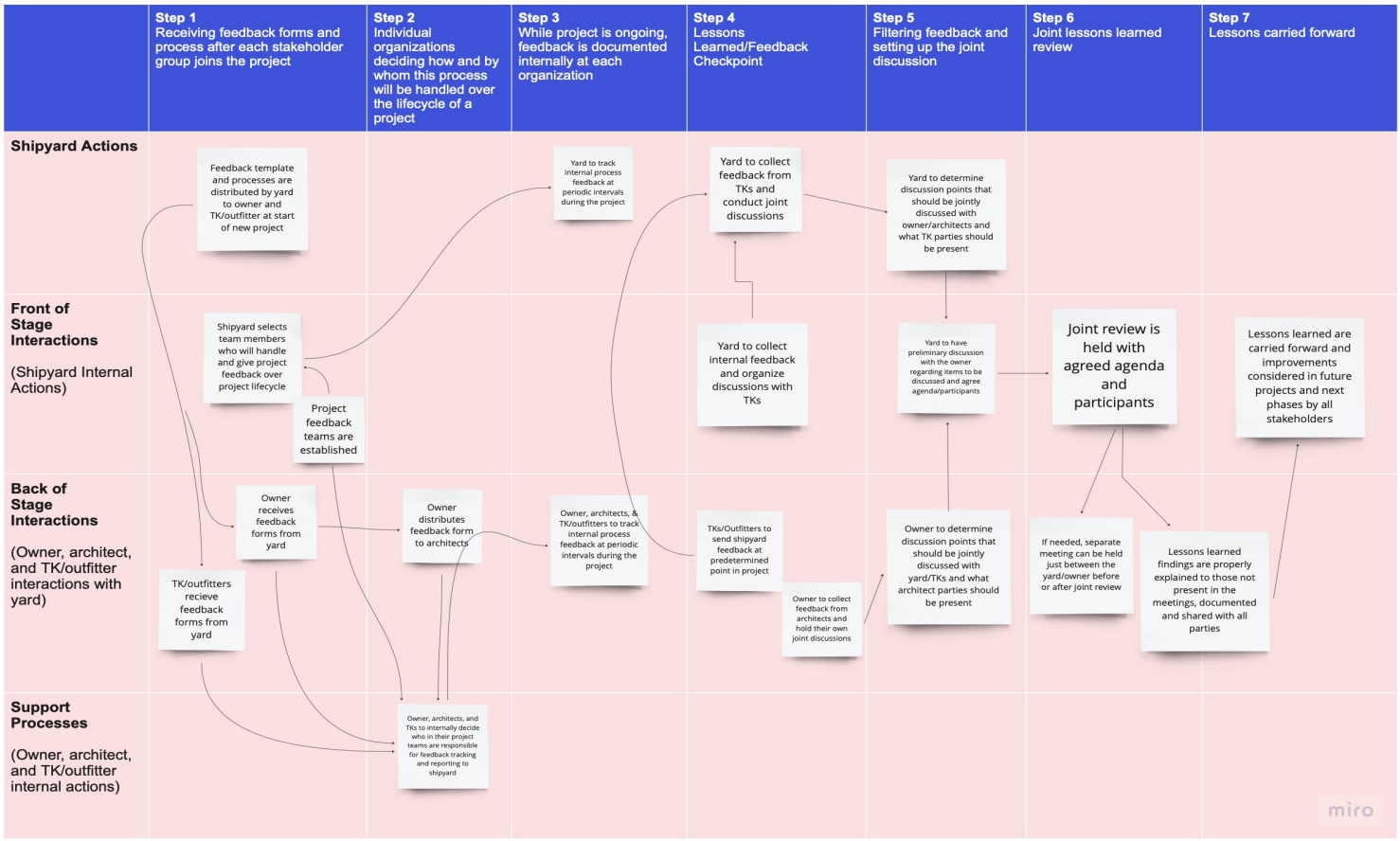

Figure 19: Final Feedback Process

Step 1

At the beginning of a new project the shipyard will explain the feedback process to occur at the end of the architectural design phase to the ship owner and later the TK contractors/outfitters as they join the project. Additionally, the feedback survey template will be distributed at this time so that all parties are aware of the information that needs to be tracked.

Step 2

As the architects are hired directly by the ship owner, it will be the responsibility of the ship owner to then communicate the process and share the survey with the architects at this same time.

Having been informed of what will be expected in this feedback process, it is then up to each organization to internally establish their project feedback teams and decide how and by whom this information will be tracked and reported.

Step 3

While the architectural design process is ongoing, each organization will continuously track their feedback about the architectural design process according to the survey template.

Step 4

When it is time to begin gathering the feedback towards the end of the architectural design phase, the shipyard will collect feedback from the TKs/outfitters and the ship owner will collect feedback from the architects. After going through the feedback received, the shipyard will then conduct individual reviews with each TK/outfitter company and the ship owner will conduct individual reviews with the architect offices.

In these reviews, the shipyard and ship owner should take this time to clarify any issues related to feedback that involves just the two organizations in the review, but also compile a master list of issues that should be discussed together in a joint review with the other stakeholders in the architectural design process.

Step 5

In this step, the shipyard and the ship owner will have a meeting to discuss and agree the discussion points that should be jointly discussed between the shipyard, ship owner, architects, and TKs/outfitters. It will also be agreed what organizations need to be present in this joint review. Depending on the feedback received, they will need to determine whether in the joint review if it should be all architect and TKs/outfitter companies, or only a specific group of predetermined stakeholder companies present.

The joint feedback review agenda, participants, and date is agreed.

Step 6

The official feedback joint review session is held with the agreed agenda and participants. If needed, a separate meeting can be held before or after just between the shipyard and ship owner if there is something that needs to be clarified or discussed solely between these two groups.

Step 7

During these meetings, the lessons learned findings are properly documented so that they can be fully explained to those who were not present in the meetings. The information will also be shared with all parties so that the knowledge created can be carried forward to improve

future architectural design processes and clarify any unresolved issues moving into the construction phase of the shipbuilding process.

Final Feedback Process Prototype Testing Feedback

After synthesizing insights from the prototype testing, there were three main points of feedback given about the feedback process outline. First and foremost was the question of whether or not this process should really include all stakeholder organizations together in a joint feedback session. It was agreed that there should be an official feedback protocol of some kind where feedback is gathered by the ship owner and shipyard from all organizations, but the opinion on the process from there generated split opinions. The general feeling was that this feedback process is much needed, but it was unclear to the respondents whether or not for the final discussion, if it should include all stakeholders or solely occur between the ship owner and shipyard. One respondent said in the prototype testing session that "There is value in having people there to explain themselves, but it could cause problems to have all these people together at one time depending on the comments discussed." Final opinions were split with half of the prototype testing respondents thinking that the feedback process should include a final meeting with all stakeholders, and half feeling that the final discussion should be between the ship owner and shipyard only.

Another question that came up during the prototype testing was that of motivation to participate in the process. It would take a great deal of time and commitment from all stakeholders to bring this process to reality. Some respondents felt that there would need to be a strong motivation to participate and/or organize this process, some respondents responded that they are already motivated to participate in such a process as they have a lot they would currently like to discuss, and one respondent pointed out that if this feedback process was outlined at the beginning of a project as an official part of the architectural design process that stakeholders would then accept it as part of the architectural design phase processes and treat it as another job to be done.

Everyone was in agreement that it is good to explain this process from the start of a new project and distribute the feedback templates from the very beginning so that feedback teams can be formed internally, and information can be properly tracked. As the architectural design process is long (+/- 2 years), individual people in charge of different phases of a project regularly rotate, so it is good to get their feedback while it is still fresh or before they transfer to a different project or company and the feedback is lost.

Feedback Survey Template

The original feedback survey template was designed with a sperate question set for each stakeholder group. There were four templates of unique questions for the ship owner,

shipyard, architects, and TKs/outfitters. The general topic categories were the same, but the questions were slightly different depending on the stakeholder group. During prototype testing, feedback was received that this added too much complexity to the process and that one template could be modified to be applicable to all stakeholder groups. The final template presented below is the final uniform feedback survey template that would be distributed to all stakeholder groups.

General Topic	Questions to be answered
Introduction of project teams and processes	Please provide feedback about your introduction to project teams and processes on this project: 1. Do you feel you had a clear introduction to project teams and processes? 2. If not, what were the challenges? 3. What do you think could be improved in future project introductions? 4. What do you think works well and should be carried over into future project introductions? 5. On a scale of 1-5 where 1= very dissatisfied and 5= very satisfied, please rate your overall satisfaction with your introduction to project teams and processes on this project. 1 2 3 4 5
Contract Specification and Appendices	1. Have there been any issues regarding the understanding/interpretation of official contract specification and appendix documentation? 2. Is there anything that is unclear, confusing, or that could be improved in future contract specification and/or appendix documentation? 3. Is there anything that is good or very helpful that should be kept in all future contract specification and/or appendix documentation? 6. On a scale of 1-5 where 1= very dissatisfied and 5= very satisfied, please rate your overall satisfaction with the clarity of the contract specifications and appendices for this project. 1 2 3 4 5
Architect Design Schedule	Please provide feedback about the architect design schedule up to this point in the process:

	1. What feedback do you have about the schedule from the start of the project up to this point? 2. Do you feel the schedule has been realistic and the time schedules kept for the following areas: A. Submittals schedule? B. Working times allocated per project phase? C. Timely delivery of design information and updates? 3. Are there any suggestions you have for future projects? 4. Are there any comments or concerns you have about the schedule moving forward into the next phases of the project? 7. On a scale of 1-5 where 1= very dissatisfied and 5= very satisfied, please rate your overall satisfaction with the planning, execution, and management of the architect design schedule on this project. 1 2 3 4 5
Communication, Collaboration, & Teamwork Practices and Processes	1. What have been the biggest communication and/or collaboration challenges with other organizations on this project? 2. What feedback do you have about the communication systems in place? A. Shared IT file sharing systems? B. Email communication protocols? C. Informal communication between companies? 3. What feedback do you have about the project meetings so far? 4. What would you want to see improved in future projects? 5. What do you think works well and should be carried over into future projects? 8. On a scale of 1-5 where 1= very dissatisfied and 5= very satisfied, please rate your overall satisfaction with the communication between

	organizations during the architect design schedule on this project. 1 2 3 4 5
Cost Complexity Process (NOTE: These questions are to give feedback specifically about the ***process***, not to discuss project specific cost issues)	Please provide feedback about the cost complexity process: 1. Do you feel the cost complexity process was clear? 2. Do you have feedback about the following areas: A. Reference areas? B. Comparison principles? C. Area borders? 3. What challenges did you encounter during this process? 4. Do you feel that you need more support in cost complexity projects? If so, what kind? 5. What would you want to see improved in future projects? 6. What do you think works well and should be carried over into future projects? 9. On a scale of 1-5 where 1= very dissatisfied and 5= very satisfied, please rate your overall satisfaction with the cost complexity process. 1 2 3 4 5
Agreed Architect Design and Next Steps	1. Is it clear what has been agreed in the final architect design packages for your areas? 2. Is the agreed architect design material currently complete? 3. If not, what is pending final approval or clarification?
Open Category (specific incidents to be discussed)	Related to the architectural design process, please briefly summarize any issues that have occurred that you would like to give feedback about and discuss that have not been covered in the above sections.

Table 7: Final Feedback Survey Template

Feedback Survey Template Prototype Testing Feedback

Feedback for the survey template was generally very positive. Everyone was in agreement that one template for all stakeholders would be best for the final version. Having one template would reduce the difficulty in analyzing results in a process that is already a substantial time commitment. There was only one reservation as to whether or not having one template for all stakeholders would make the answers too generalized, but this respondent did also agree that continuing with one template only would be for the best.

During the prototype testing sessions that were held individually with each respondent, I received many comments and opinions about the questions themselves. I made notes of the questions that were deemed to be unclear or required further specification. We discussed the question categories and analyzed which questions would be relevant to ask all stakeholders and which questions would apply to only one or two groups only. Some respondents had additional questions that would be good to add from the point of view of their stakeholder group. Terminology overall is something that is tricky as each organization and project may have slightly different jargon when referring to similar things. There was also feedback about the heavy use of open questions. One respondent felt that it would be better to add some closed multiple-choice questions to the survey as they felt busy people respond better to multiple choice question options. Based on all of the feedback I received from the prototype testing rounds, the final template presented considers the insights gathered and is the final iteration of the feedback template.

7.2 Discussion and Reflections

In this final section I conclude the thesis report by reflecting and providing my thoughts and learnings about the theoretical framework and methodology/development project. I conclude by suggesting what the next steps for this development should be if it were to continue.

Reflections on the Theoretical Framework

The theoretical framework assisted in the sensemaking process of the stakeholder relationships involved in the architectural design phase. Both systems thinking and network theory have a heavy focus on studying the connections and interactions between actors, and the application of these theories to better understand the nature of the system, networks, and ultimately relationships between these stakeholder groups highlighted breaks in communication channels and collaboration practices between companies and added greater depth in understanding why some of the collaboration challenges between these stakeholder groups occur.

Exploring the foundations of organizational culture was interesting as I feel that there exists unique work cultures not only within organizations, but also within stakeholder networks. Within the shipbuilding stakeholder network, each stakeholder company has their own

individual work culture, however, when each unique stakeholder network is established for a new build project, a unique network culture forms that is directly influenced by the interactions between the unique combination of stakeholder groups. When seeking to find challenges and solutions in collaboration processes between stakeholders, it is important to weigh not only the attitudes towards collaboration found within the individual culture of an organization, but also within the network itself. Ultimately, one is not able to directly influence the inner workings of individual companies, but in finding a solution to collaboration challenges, the solution can have an impact on the culture of the network itself. It is my aim for the feedback tool that was created to be used in a way to enhance the collaborative culture within the stakeholder networks.

The purpose of the thesis, the development of a feedback tool, was designed as a solution to a shortcoming in knowledge sharing between the stakeholders in the network. By using the facts generated from all stakeholders in the feedback process that was developed, insights are to be synthesized that will lead to opportunities for improvement. The combination of these three factors (facts + insight synthesis+ opportunity areas) produces actionable insights (Marsh 2022, 270). This feedback tool is designed to generate actionable insights that can be used to make improvements to the collaborative processes in the architectural design phase of future projects. The structure for the feedback tool process was based on a combination and adaptation of three of the four the methods presented in the organization diagnostic tool set presented by Harrison (2005).

Reflections on the Methodology and Development Project

Overall, I am pleased with the outcome of this development project. This project had 18 different participants representing different stakeholder groups involved in the architectural design process for a new build ship. The participants in this thesis project were carefully selected. This was a sensitive topic of research and required participation from people who had specific knowledge and experience that were willing to give feedback about the collaborative processes between stakeholder companies during the architectural design phase of a shipbuilding project. As the project phases went forward, the participation and feedback from the stakeholder groups became more and more limited. However, the participants who were involved were very knowledgeable and the majority respectively had decades of experience in the shipbuilding industry, so their feedback, participation and insights were deeply knowledgeable and invaluable to this project.

There were some challenges and limitations in the development phase of the project, but the process was educational both in seeing what worked and what did not. The greatest challenge in this development project was in framing the purpose and discovering the opportunity for the development of a tool to improve collaborative processes between stakeholders. The

main challenge was that although the scope of the shipbuilding phase to be explored was narrowed to the architectural design phase, the fact that this architectural design phase was to be generalized so that it could apply to many different shipbuilding projects added a great level of complexity to an already complex process. However, to move forward with the project, an outline for one version of this architectural design phase was required to be constructed in order to serve as a concrete starting point for the process to be analyzed in the development project.

The double diamond method was a good guide for this development project, and the steps to be taken from one phase to another were clear and easy to plan. The workshop activities planned were somewhat restricted due to taking place in a virtual environment, but I feel that the workshops were still very productive, and the outcomes and insights gathered were of great use to the development project. As mentioned in the development chapter, the thesis project does not take this feedback tool concept to final delivery. In the final section of this report, I will outline what should occur as the next steps in this process.

Next Steps

The overall number of participants was a limitation of this thesis study and further validation should be carried out to verify the findings presented in this study. This feedback tool was developed to serve as a template that can be adapted to the slight differences in architectural design processes in the cruise shipbuilding ecosystem. For this template to be utilized, it may require slight modifications to suit the parameters of each specific project.

Additionally, each stakeholder group (particularly the group who would be leading the process) would need to make a firm commitment to the time and money it would take to organize and lead this feedback process. Within each organization, feedback project teams would need to be defined, and there would need to be the willingness and motivation to participate openly and constructively in this process. Ultimately, the purpose of this feedback process is to uncover actionable insights for areas of improvement in the architectural design process. There needs to be a receptiveness from all stakeholder groups involved to give and receive constructive criticism, and a willingness to make the adjustments needed to future processes based on the knowledge gathered.

It would also be important to discuss and test if the final phase of the feedback process should include a discussion between all stakeholders or only be between the ship owner and the shipyard. There are pros and cons to both scenarios and further study and testing would need to be conducted to verify which approach would be the most conductive to the feedback process. Regardless of how the process ends, it is still a step in a positive direction to establish a feedback process where the ship owner and shipyard have collected feedback from all their respective stakeholder organizations and are able to come together to have a

productive fact-based discussion about improvements to be made to the collaborative processes in the architectural design phase.

It is my hope that this feedback tool could be used to improve future architectural design processes by bringing all stakeholders together to discuss many of the collaboration issues that constantly occur. This feedback process will hopefully provide insights, and foster empathy and understanding between stakeholders on issues that cannot change by clearly communicating reasons why something is the way it is and taking steps to actively and positively change the issues that can.

I would argue that in any situation where many stakeholders come together to work on a complex project of any kind (even outside the realm of shipbuilding), that it is imperative for there to be a feedback process. Feedback processes ensure that collaboration challenges are uncovered, discussed, and resolved within stakeholder networks. Service design processes and methods can be used to design a similar feedback process with relevant questions applicable to a different sector than that of shipbuilding. However, within the realm of shipbuilding, it is also possible that if the feedback process and tool proposed in this thesis project is successful, additional feedback processes could be designed to address challenges in other shipbuilding phases not explored in this development project.

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Appendices

Appendix 1: Interview Field Guide/Questionnaire

New Build Project Stakeholder Communication Questionnaire

Thank you for taking the time to fill in this questionnaire or for participating in this questionnaire or interview for my master's thesis research. The aim of this questionnaire is to gather viewpoints and opinions from various stakeholders in the architectural design process. It is understood each stakeholder (and each new build project) has a different process. Through these questions I hope to gain insights from each stakeholder perspective. The spotlight is on exploring communication between stakeholders; how the communication channels and roles are established, communication of project requirements and goals, and the relationships between organizations. *The specific focus is on how these topics are established at the beginning of the architectural design phase of a new build project.*

Please note that for my thesis I will not use your actual name or workplace, but I do need to use a job title. For example: "…. **Design Lead A** at **Cruise Company X** reports that…". Please provide in the questionnaire below the job title you would like to be used, and if you have any further questions or concerns about how your information will be used in this thesis project, please do not hesitate to contact me.

I truly appreciate your participation in this survey, and I look forward to reviewing your response!

Background Information

1. What is your current job title (or title you would like used in this thesis), and how long have you been in this position?

2. Have you previously had any other positions related to architectural design in new build projects and/or have you worked for any stakeholders in these projects other than the one you are currently with? For example: ship owner, shipyard, outfitting, architect/design office, or engineering company?

Project Communication and Relationships

The following section focuses on your thoughts about how communication is established at the start of the architectural design phase (from when the preliminary master plan is agreed with the shipyard and architectural development begins, into the initial kick-off meetings). If you typically join later in the process (ex. TK contractors), then please answer each section from the perspective of when you first join a new build project.

Note: "Stakeholders" from here forward refers to the ship owner, shipyard, architects, and TK contractors

3. Establishing Communication in a New Build Project

General Question: How are you introduced and how do you establish communication with other stakeholders in each new build project? What works and what could be improved?

- At what point in the beginning of the architectural design process are you informed who the contact people from each of the stakeholder groups will be for the project?
- How do you establish first contact with each of the stakeholder groups in the new build project?
- How are you informed who you can contact and through which channels can you contact them?
- Are there limitations to who you can contact outside your organization? In your opinion are the limitations needed? Does someone explain why there are limitations? How do you feel this affects your work?
- Do you feel the information about the necessary people to contact in each organization is provided at the appropriate time?
- What do you feel currently works with the stakeholder introduction process and should be kept?
- What do you feel are the shortcomings of the stakeholder introductions and what do you feel could be done to improve them?

Response:

4. Project Kick-Offs (including outside organizations)

Note: "Kick-off" in this context refers to your organization's introduction to the new project that includes other stakeholders in the project. I would like to focus on the kick-offs that involve the introduction of one or more additional stakeholder organizations (not strictly internal company project kick-offs). It is understood that different stakeholders have different introductions to each project. Please describe how this process occurs for your organization.

General Question: Describe the kick-off process for various new build projects: What content is included and what stakeholders are part of the process? What works and what could be improved?

- Is your organization typically involved in kick-offs at the start of new projects? If so, how many different kick-offs do you participate in, what groups of stakeholders are involved, and what project information is relayed in these kick-offs?
- What information do you feel is important to convey about the new build projects that *is currently included* in project kick-offs? *(Please note which project kick-offs you are referring to if your organization is part of multiple kick-offs described in question a. above)*
- What information do you feel is important to convey about the new projects that *is **not** currently included* in project kick-offs? *(Please note which project kick-offs you are referring to if your organization is part of multiple kick-offs described in question a. above)*
- Do you feel that all necessary representatives from various stakeholders in the new build project are properly introduced and in attendance for these kick-off meetings? If not, what do you feel needs to be included/improved?
- After the kick-off when the project begins, is it clear who to contact from each organization and specifically who oversees what specific project tasks?
- Do you feel these kick-off events come at the appropriate time in the project lifecycle? If not, when do you feel these kick-offs should take place?

Response:

5. General Communication Issues

General Question: What are the biggest communication challenges when it comes to interacting with stakeholders outside your organization and could this be better addressed at the beginning of each project?

- Over the course of the project, what are some of the biggest project communication challenges you face across the stakeholder network?
- Do you feel any of these challenges stem from how the communication was established at the start of the project?
- How does miscommunication at the start of the project affect subsequent project phases and impact your project work?
- Could any of those challenges be addressed better at the beginning of the project? How?

Response:

6. Communication of Project Requirements and Goals

General Question: Is it clear at the start of each new build project what the responsibilities for your organization will be? Are there ever conflicts of interest, schedules, or resources? If so, how are they communicated and/or resolved within the larger stakeholder network?

- At the start of a new build project, is it clear for your organization what your project responsibilities are, how they impact the project as a whole, and/or the work of other stakeholders?
- What (if anything) has been unclear at the start of previous projects regarding the project goals and requirements for your organization?

- Do you feel that your organization's internal understanding of the project requirements, time-lines, and goals are clear?
- Do internal company goals, timelines, and resource availability within your own organization ever conflict with any new build project schedules and create misalignments in the ability to achieve project milestones on time?
- Are any of these misalignments typically known internally at the start of a project?
- How are these misalignments communicated with other stakeholders in the project?
- What are some of the consequences of these misalignments?
- What do you feel could help resolve these misalignments?

Response:

7. Teamwork Across Stakeholder Networks

General Question: Do you feel a sense of teamwork when collaborating with people outside of your organization while working towards the successful completion of a new build project?

- What are some of the challenges when it comes to working with people outside your organization on new build projects?
- Do you feel a sense of teamwork when working with people outside your organization on these newbuild projects? If so, please describe situations where you felt a sense of teamwork with people outside your organization and what events/actions facilitated these feelings.
- What could be done to improve this teamwork dynamic across the new build project stakeholder network?

Response:

8. Final Thoughts

Is there anything you would like to add about the topic of communication between stakeholders; how the communication channels and roles are established, communication of project requirements and goals, and the relationships between organizations that I did not ask, but that you feel is a concern, something that could be improved or investigated further? *(Specific to the beginning of the architectural design phase of a new build project, or whenever your company first joins?)*

Response:

Thank you again for your time and your response!