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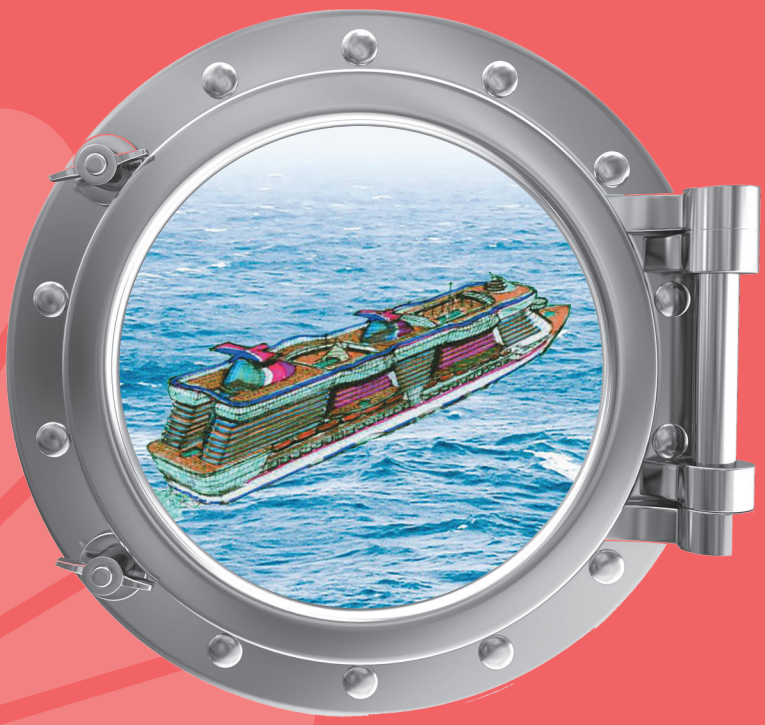

IDEATION FOR FUTURE CRUISE SHIPS

Collaborative interorganisational foresight in cruise ship concept ideation

Leena Jokinen

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ABSTRACT

The thesis addresses two main questions: how to capture the dynamics of futures-focused thinking and acting in everyday work contexts and how *futures studies* (FS) methodology can be developed for analysing how social relations shape the future. Drawing on *corporate foresight* (CF) research, which develops knowledge about futures and alternatives to support organisational decision making, this thesis explores the social aspects of future cruise ship concept ideation and sustainability enhancement.

The aims of the thesis were to explore actors' relationships and operational-level collaborations on foresights in the context of cruise ship building in Finland – mainly at a site in Turku – and to advance frameworks to analyse social relations in this interorganisational setting. Adopting a critical perspective on social relationships and structures, this study explores the flow of futures insights and ideas within ship builders' networks and seeks to make the concepts of futures-focused collaboration more useful for managerial practice.

The research questions address the applicability of CF to cruise ship concept ideation and practices, the kinds of relationships that can be identified within these networks, the flow of futures insights during collaboration and focal brokers and sources of futures insights. In addition, the thesis seeks to identify futures images of sustainability enhancement and determine how these images evolve in collaboration. To answer these questions, the study employed three methods: (1) *semi-structured interviews*, to obtain qualitative data on the role of social relations in constructing visions of the future; (2) *social network analysis* (SNA), which provided quasi-quantitative data on the structure of network actors' social relations; and (3) the *workshop* method, which was used to analyse how the actors' interactions shape visions of the future.

The results confirmed that while ship building is an evolving process, futures-focused ideation and collaboration play a pivotal role in the concept ideation phase of planning. However, ideation and the incorporation of new visions tend to happen in relatively closed circles of actors that include ship owner intra-organisational teams, design agencies and intra-organisational design teams within the yard. In the subcontractor network, futures-focused ideation is scattered and tends to be organised around shipyard actors, such as managers and department heads. In relation to sustainability enhancement, the results reveal that, while the joint project network plays a relatively peripheral role in collaborative foresight activities, it also contributes boundary-cross-

ing insights to the actors' own ideation. The study identifies four futures for sustainability enhancement within the cruise ship building process: *money rules, the customer is always right, local economy focus,* and *the most sustainable ships in the world*. The results showed that an analysis of social structures and actor relationships is a meaningful addition to FS and especially to collaborative foresight methods.

The findings confirm that a long-term perspective is present and meaningful in everyday operational collaborations and that futures-focused thinking occurs within interorganisational networks, including communication with business partners and industrial associations. The challenge is in linking social and operational processes to facilitate the formation and flow of futures insights between different systems (e.g. strategic corporate foresight and sustainability enhancement). As identified herein, addressing this challenge will require the development of novel processes that integrate futures-focused insight formation in dynamic and informal relationships with more formal and explicit corporate- or network-level foresight systems.

KEYWORDS: collaborative corporate foresight, collaborative sustainability, collaborative networks, futures images, cruise ship concept planning

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TIIVISTELMÄ

Opinnäytetyössä tutkitaan risteilyalusten konseptien ideointia ja vastuullisuuden kehittämistä. Opinnäytetyö keskittyy kahteen pääkysymykseen: miten tulevaisuuden hahmottamista ja siihen liittyvää toimintaa voidaan analysoida osana arkityötä ja miten tulevaisuudentutkimuksen menetelmiä voi kehittää sosiaalisten suhteiden analysoinnissa. Tutkimus liittyy strategiseen ennakointiin (*Corporate Foresight*), jonka tarkoituksena on tukea strategista päätöksentekoa ja luoda siihen näkemyksiä tulevaisuuden vaihtoehtoisista kehityssuunnista.

Tutkimuksen tavoitteena oli analysoida ennakointiin osallistuvien toimijoiden välisiä sosiaalisia suhteita ja yhteistyötä risteilyalusten konseptien luomisessa ja alusten rakennusvaiheen vastuullisuuden kehittämisessä. Tutkimus keskittyy risteilylaivojen konseptien ja vastuullisuuden kehittämiseen Suomessa, lähinnä Turun telakan yhteistyöverkostoissa. Tässä työssä on valittu kriittinen ja muutokseen tähtäävä näkökulma toimijoiden välisiin suhteisiin ja sosiaalisiin rakenteisiin. Tämä näkökulma tarkoittaa tulevaisuuden ymmärtämistä jonkin tiettyjä arvoja sisältävän päämäärän tavoittelemisena ja yhteisesti luotavana tai rakennettavana. Tutkimuksen tarkoituksena oli analysoida tulevaisuutta koskevien ideoiden muodostumista laivanrakentajien verkostoissa ja pyrkiä tuomaan yhteistoiminnalliseen ennakointiin uusia menetelmiä sekä tuoda johtamiskäytäntöihin sosiaalisia suhteita analysoivia välineitä.

Tutkimuskysymykset liittyvät strategisen ennakoinnin toteuttamiseen osana operatiivista toimintaa ja sosiaalisten suhteiden analysoinnin soveltuvuuteen risteilyalusten konseptien ideoinnin kontekstissa. Keskeiset tutkimuskysymykset olivat: Millaisia sosiaalisia suhteita voidaan tunnistaa laivanrakentajien verkostoissa; miten tulevaisuustieto virtaa yhteistyössä; ja keitä ovat keskeiset toimijat ja ideoiden lähteet? Lisäksi opinnäytetyössä tunnistettiin vastuullisen laivanrakennuksen kehittämiseen liittyviä tulevaisuuskuvia ja näiden tulevaisuuskuvien kehittymistä yhteistyön aikana. Tutkimuksessa käytettiin kolmea päämenetelmää: *Teemahaastatteluja*, jotka tuottivat laadullista tietoa tulevaisuutta koskevista näkemyksistä ja tietoa sosiaalisista suhteista laivakonseptien luomisessa. *Sosiaalista verkostoanalyysiä*, joka tuotti lähes-kvantitatiivista tietoa toimijoiden sosiaalisten suhteiden rakenteesta. *Työpajamenetelmällä* analysoitiin, miten toimijoiden vuorovaikutus muokkaa ja kehittää edelleen tulevaisuuskuvia.

Saadut tulokset osoittivat, että laivakonseptien suunnittelu on kehittyvä ja muuttuva prosessi, jossa tulevaisuuteen suuntautuvalla ajattelulla ja toimijoiden välisellä

yhteistyöllä on keskeinen rooli konseptin ideointivaiheessa. Uusien ideoiden ja visioiden luominen näyttää tapahtuvan suhteellisen suljetuissa piireissä, kuten esimerkiksi varustamoiden sisäisissä ryhmissä, suunnittelutoimistoissa ja eri organisaatioiden sisäisissä kehitysryhmissä. Tässä yhteydessä tutkitussa alihankkijaverkostossa tulevaisuuteen suuntautunut ideointi oli hajanaista ja ideointi tai uusien ajatusten jakaminen näytti keskittyvän telakan toimijoiden ympärille. Projektin aikaisella organisaatioiden välisellä yhteistyöllä ei näyttänyt olevan merkittävää roolia yhteistoiminnallisen vastuullisuuden kehittämisessä, mutta projektissa tapahtuva yhteistyö kuitenkin tarjoaa uusia ja organisaatioiden omia rajoja ylittäviä näkemyksiä ja oivalluksia. Tutkimuksessa tuotettiin neljä tulevaisuuskuvaa vastuullisuuden kehittämiseksi risteilyalusten rakennusprosessissa: *Raha ohjaa; Asiakas on aina oikeassa; Paikallinen talous keskiössä ja Maailman vastuullisemmat laivat.* Tulokset osoittivat, että sosiaalisen rakenteen ja suhteinen analysointi on merkittävä lisäys tulevaisuudentutkimuksen ja erityisesti strategisen ennakoinnin menetelmiin.

Yhteenvetona voidaan todeta, että tulevaisuusnäkökulma on merkittävä osa operatiivisesta yhteistyötä, ja että tulevaisuuteen suuntautuvalla ajattelulla on selkä rooli organisaatioiden välisissä verkostoissa mukaan lukien esimerkiksi yhteistyö viestinnässä ja toimialajärjestöissä. Haasteena on yhdistää operationaalinen toiminta ja sosiaaliset prosessit muuhun järjestelmälliseen ennakointitoimintaan (esimerkiksi strategisen tason ennakointiin ja vastuullisuuden kehittämiseen). Tässä tutkimuksessa on tunnistettu tarve kehittää uusia prosesseja, jotka keräävät ja tunnistavat yhteistyösuhteissa syntyvää näkemyksellistä tietoa. Organisaatioiden välisessä yhteistyössä syntyvät uudet ideat ja ajatukset olisi hyödyllistä saada liitetyksi eri toimijoiden omiin ennakointijärjestelmiin tai verkoston yhteisesti jaettuun ennakointisysteemiin.

ASIASANAT: Strateginen ennakointi, yhteistoiminnallinen vastuullisuus, yhteistoimintaverkostot, tulevaisuuskuvat, risteilyalusten konseptisuunnittelut

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The process of writing a thesis is never just an individual effort but draws on the highly interconnected work of countless contributors. This is especially true in the present case, as all the studies were co-authored and much of the work was undertaken as part of a joint project. As the author of this thesis, I take credit and responsibility for the main research ideas and for bringing them together in a coherent form. Along with my co-authors, I wish to acknowledge the contributions of previous work and the existing body of literature.

I offer my sincerest thanks to my supervisors, Tuire Palonen and Toni Ahlqvist. I was lucky to have Tuire as a supervisor and mentor on this journey. Her knowledge of social networks is outstanding, as is her ability to guide a doctoral dissertation. Above all, I am deeply grateful for her kindness and friendliness. Toni has always been supportive and provided invaluable help in terms of understanding futures studies theory, handling the dissertation process and managing the economic aspects of the project.

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9.2.2022
Leena Jokinen

LEENA JOKINEN

Education Manager Leena Jokinen works at the Finland Futures Research Centre, University of Turku. Her main research themes cover strategic foresight, collaborative foresight networks and futures guidance methodology. Jokinen collaborates with the maritime sector, including private, public and non-governmental organisation actors, as well as with education sector actors at all levels. She manages several projects and works also as a supervisor and coach.

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List of Original Publications

This dissertation is based on the following original publications, which are referred to in the text by their Roman numerals:

I Keiramo, M., Heikkilä, E., Jokinen L., & Romanoff, J. (2018). A concept for collaborative and integrative process for cruise ship concept design – from vision to design by using double design spiral. *Marine Design XIII*, 2018(1), 193–202.

II Jokinen, L., Keiramo, M., Kivistö, P., & Palonen, T. (2020). Past, present and futures of cruise ship concept design: From the perspective of the Finnish cruise ship industry. *Nautica Fennica,* 2020, 132–155.

III Jokinen, L., Palonen, T., Kalliomäki, H., Apostol, O., & Heikkilä, K. (2020). Forward-looking sustainability agency for developing future cruise ships. *Sustainability,* 12(22), 1–20.

IV Jokinen, L., Mäkelä, M., Heikkilä, K., Apostol, O., Kalliomäki, H., & Saarni, J. (2022). Future images for constructing sustainable cruise ships. *Futures,* 135, 2873.

1 Introduction

This dissertation study examines cruise ship building in Finland, focusing in particular on concept ideation at a specific site in the Turku area. Adopting a foresight approach, this study explores the influence of ideation in shaping long-term futures through networked and interorganisational collaboration. The cruise ship industry was identified as a suitable context because the product has remained in use for about 50 years, and a futures-focused approach to ideation would facilitate the strategic management of long-term development and value creation for all involved parties. Issues such as company sustainability make this a rich testbed for collaborative spaces for constructing futures.

The articles in this dissertation explore the social aspects of ideation, the flow of futures insights and futures image-sharing in the cruise ship industry. The transdisciplinary approach – understood here as a meeting ground for various knowledge traditions, procedures and actors (see, for example, Niemanis et al., 2015) – combines theoretical concepts from industrial design, foresight and social network analysis (SNA) to develop a new perspective on collaborative ideation. The key aims were to capture the complex nature of the ideation process in this context and to explore how ideas about the future shape initial concepts. To the best of our knowledge, this approach is rare in the existing literature and can therefore be expected to deepen our understanding of how cruise ship planning evolves within a specific social context.

The dissertation draws on three distinct perspectives: the current approach to cruise ship planning, the history of cruise ship building in Finland and collaborative sustainability enhancement. The modern shipbuilding industry (and cruise ship building in particular) is networked and project based and networks evolve from one project to the next (Saarni et al., 2019). The planning process begins with an outline and draft and with a collaborative and ongoing detailed design throughout the construction process. These activities are examined here from the perspective of interorganisational collaboration among company employees and network actors, such as contractors, service providers, application developers, academics and NGOs. Within the maritime industry, innovation and research have tended to focus on technical and

process innovations and larger regional networks, rather than on networks of collaborating individuals and companies (Xue et al., 2014; Kujala et al., 2018; Shi et al., 2019). In this thesis, the engineering design perspective sets the preliminary conceptual frame for the contemporary ship concept planning process along with a system-level view on foresight. This background informs the projected futures images of concept creation and sustainability enhancement.

Although the earliest ships built solely for cruise operations appeared before World War II (Andrews, 2008), the present account relates to modern cruise vessels from the 1960s onward. A growing market prompted the emergence of a new type of ship, built and designed specifically for mass market cruising and influencing the subsequent direction of Finland's shipbuilding industry. Finnish shipyards were among the first in the world to build modern passenger ships designed exclusively for cruising and soon gained an international reputation in this sector (Teräs, 2017; Peter & Id, 2017; Jokinen et al., 2020). However, the leading role of Finnish shipyards in cruise ship construction remains underrepresented in the literature, as is the issue of concept planning (Peter & Id, 2017). The human-related approach to the history of concept ideation highlights the social connections of the focal designers, engineering planners and other main influencers. This approach targets the historical perspective of the interconnected nature of concept ideation.

Finally, the issue of collaborative sustainability enhancement bears on the social aspects of ideation, foresight activities and the formation of futures images. Collaboration is less widely researched in maritime networks than, for example, in the construction industry or in networks of small and medium-sized enterprises (SMEs) (Cheng et al., 2015). The social aspects of futures thinking (e.g. group-level images of the future) have also been less widely studied (Kuhmonen, 2017; Kaboli & Tapio, 2018; Morgan, 2020). In the present context, social aspects refer to any form of dynamic dialogue or interaction in which the future is contingent and open to the influence of individual or collective actions that initiate ideation. The study focuses on the operational relationships between managers, designers, planners, experts and others in interorganisational relations beyond formal foresight systems. Sustainability enhancement is an inherently interconnected function of the ship planning and construction phases, in addition to the long-term perspective required by sustainability enhancement. Therefore, it is a fruitful concept in research on interorganisational collaborations in long-term development. The relevant theoretical premises are discussed in Sections 2.2.2 and 2.2.3.

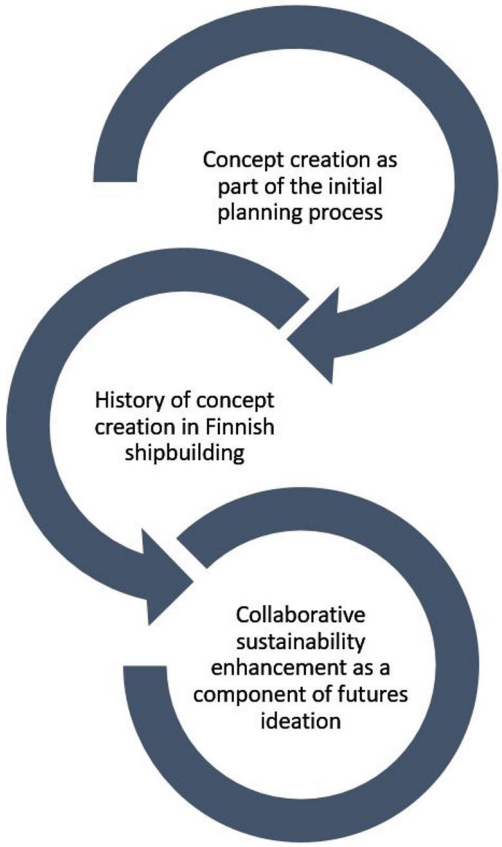

Figure 1. Dissertation perspectives.

1.1 Research strategy and methodology

To link the research questions to the theoretical premises, this empirical study analyses how futures-focused thinking and acting contribute to cruise ship ideation and construction through interorganisational interaction at the everyday operational level. The mixed methods approach, which includes semi-structured interviews, SNA and workshops, drew on other contextual data, such as meeting minutes and observation notes, to enhance the applicability and accessibility of the findings and their relevance for network actors. By combining qualitative methods with SNA, the methodology elicits diverse views regarding futures insight creation and sharing and sustainable transformation, clarifying the influence of social structures on future-focused ideation and new ideas about collaborative sustainability. The study contributes to Futures Studies (FS) methodology by (1) strengthening the social relations perspective to operational-level foresight by applying SNA and visualising social

relations and (2) suggesting ways for measuring social aspects in futures insights sharing. The methodology is discussed in more detail in Section 3.

1.2 Aims of the study

This dissertation explores futures-focused ideation and interaction as elements of foresight, reflecting how futures knowledge is understood. From this perspective, insights and ideation practices are informed by a set of beliefs that extend beyond facts and empirical proofs (Tapinos & Pyper, 2018; Mastio & Dovey, 2021; Dufva, 2015). The general aim was to clarify how social relations influence futures-focused idea exchange and collaboration in pursuing organisational and collective goals (such as sustainability enhancement). By illuminating key relationships and how futures ideas are cultivated in the interactions between partners, this study seeks to advance our understanding of the critical contribution of social relationships to collaborative foresight. To address challenges for corporate foresight (CF) (see Section 2.2) and to enhance foresight practices (Gordon et al., 2020; Rowland & Spaniol, 2020), this study highlights the role of critical analysis and transparency in collaborative insight generation and flow. Drawing on critical social theory (Mische, 2009; Burkit, 2016; Minkkinen, 2020), this study assesses the influence of actors' roles and social structures on futures-focused collaboration.

Sustainability enhancement has a strong connection to long-term operations within the ship building industry. Traditionally, the concept of sustainability in shipping has focused on controlling the environmental impacts during the vessel's operation (Cheng et al., 2015). Recently, greater emphasis has been placed on the interconnected actions and actors in complex project-based networks. Even though sustainability practices are often characterised by incremental enhancements within one organisation, it is increasingly recognised that sustainability innovations are systemic and require multiple co-operating organisations (Rohrbeck et al., 2013). A better understanding of sustainability enhancement, not only in the shipbuilding industry but more generally in project organisations, allows networks to have productive dialogue and create value from sustainability.

The aims of the study can be summarised as follows:

- To clarify collaborative foresight practices by exploring collaborative ideation for futures in terms of social relations and operational-level perspectives, i.e. sustainability enhancement, in cruise ship building networks.
- To advance frameworks and methods for analysing collaborative ideation regarding future cruise ships.

- To highlight the significance of social relationships for collaborative ideation.
- To enhance the managerial utility of concepts and methods for collaborative futures ideation, i.e. on sustainability enhancement.

1.2.1 Research questions

The research questions emerged from a joint project involving corporate and academic partners, with particular reference to articles III and IV, which focused on collaborative sustainability enhancement. Based in part on my personal experience of collaborating with the Turku yard and partners from the shipbuilding field, these questions address perceived opportunities for improving foresight activities and the limitations of existing FS tools in capturing the richness of futures ideas and ideation.

The focus on social relations facilitates testing and further development of FS methodologies, including an analysis of social networks, key actors within the network and individuals' roles as insight brokers. As shipbuilding is a highly networked business area, the subcontractor network must also cooperate and coordinate in pursuit of sustainability enhancement. Finally, this study addresses the dynamics of collaborative interaction during ideation and the evolution of futures images in workshop settings.

To clarify the initial phase of the cruise ship planning process and the relevance of CF, this study examines the social relationships among key actors – managers, experts, designers and interorganisational stakeholders – and determines how these relationships influence ideation by addressing the following research questions:

- RQ1: How can foresight contribute to cruise ship concept ideation?
- RQ2: What interorganisational relationships can be identified within networks of ship concept designers and planners?
- RQ3: How do futures insights on sustainability enhancement flow in the joint project context? Who are the focal insight brokers and sources of sustainability enhancement within the project network?
- RQ4: What futures images of sustainability enhancement are constructed within the joint project context? How can the evolution of futures images in workshop settings be analysed?

These research questions, which guided the research strategy and methodology, are discussed in greater detail in Section 3 and are linked to the dissertation articles.

2 Theoretical Framework: Relational and Practical Perspectives on Collaborative Interorganisational Foresight

This section draws on theoretical perspectives to analyse collaborative interorganisational foresight (CIOF) in the present context. These theoretical foundations are situated within the broader FS and CF traditions to frame collaborative futures-focused actions in shipbuilding organisations and networks.

2.1 Positioning the study: FS paradigms and the corporate foresight tradition

FS is a relatively young field, and its multiple paradigms reflect a plurality of approaches. Minkkinen (2020) offers a useful theoretical overview of the evolution of FS paradigms. Drawing on critical social theory, the present study highlights how a multidisciplinary approach can exploit the emancipatory function of knowledge and critical realism in the context of collaborative CF (Habermas & Fultner, 2001; Ahlqvist & Uotila, 2020; Patomäki, 2020) to reveal underlying structures that influence probable or desirable images of the future and how these are generated and imposed on others (Slaughter, 1990; Dator, 2019). FS is connected to practical actions, as it constructs the future while exploring possible alternatives and anticipating novelties (Voros, 2007, p. 74). This study addresses participatory foresight actions and perceptions of the desirable future of actors involved, i.e. shipbuilders or designers. Roy Amara (1981) provided a classical division of future dimensions: the possible, the probable and the preferable. These three dimensions are all present in the futures-focused actions of CIOF.

As the perspective adopted here emphasises futures-focused ideation and envisioning rather than rational planning or process analysis, it represents the critical-transformative paradigm in FS (see Minkkinen, 2020) and focuses more on how futures are discussed and constructed rather than on content issues, such as coherent scenarios for cruise ship building. The analysis addresses dominant social roles and

founding assumptions, as well as context-specific knowledge and practices that inform alternative views of the future. Transformative elements include the cyclical development of thoughts, re-conceptualisations, negotiations and conflicts, as well as normative views of the future (Slaughter, 2004). Minkkinen (2020) distinguishes between critical-transformative and critical-analytical paradigms in terms of normativity; specifically, critical-transformative paradigms seek to influence the future in a value-driven direction. In the present study, for example, the topic of sustainability enhancement is normative because it relates to initiating change in a particular direction and negotiating new meanings and lines of argument. The timeframe applied here is visionary, as transformations within concept ideation are expected to take several years. The visionary timeframe is described as long-term, or far futures, with a scope ranging from 10 years to several decades (Malaska & Holstius, 1999; Mische, 2014a).

The critical stance questions dominant procedures and positions of influence to build awareness of social structures and sources of insight. As cruise ship building is a highly networked industry, all network actors must be willing to join forces to build shared understandings for successful ideation and sustainability development. Transparency of ideation is assumed to increase trust and willingness to share ideas (Rohrbeck & Schwarz, 2013). In the context of CF, the critical perspective helps to expose structural factors, change processes and human-centred thinking and acting to reveal how futures are constructed rather than scanning horizons and trends or creating alternative scenarios. When applied to everyday actions, this critical perspective highlights the transformative potential of actors and the normative and emancipatory aspects of futures making by 'decolonising' the future (Miller, 2018).

The two main strands of CF research address the organisation's ability to anticipate future changes (e.g. Ahuja et al., 2005; Tsoukas & Shepherd, 2004) and the processes or actions that companies adopt to prepare for the future (Heger & Boman, 2015; Rohrbeck & Kum, 2018). In general, CF is characterised as a tool that supports managerial decision-making and strategic management. Most definitions of CF emphasise its role in securing competitive advantage for the company (Paliokaitė & Pačėsa, 2015; Rohrbeck & Kum, 2018; Rohrbeck et al., 2015), and organisations are seen as active players that prepare for or even construct the future (Tsoukas & Shepherd, 2004; Paliokaitė & Pačėsa, 2015; Heger & Boman, 2015; Schwarz et al., 2020).

In the vast body of literature on interorganisational collaboration (e.g. strategic alliances, supply chains and innovation networks; Shi et al., 2019), some studies of CF development have traced the emergence of approaches that emphasise interaction and social relations (e.g. Daheim & Uerz, 2008; Kurki, 2020). However, the FS literature on collaborative foresight has typically emphasised the macro level of regional or national foresight, highlighting knowledge creation or linking foresight to organisational processes (Dufva, 2015; Ahlqvist & Uotila, 2020; Weber et al., 2015).

Nevertheless, micro-level collaboration (among small organisations or individuals) has attracted increasing interest, both conceptual and methodological (Gattringer et al., 2017).

Unlike approaches such as open innovation, collaborative foresight usually pursues a specific idea or domain (van der Duin et al., 2014; Kurki, 2020; Gattringer & Wiener, 2020). Still, open innovation and co-creation activities can be compared to collaborative foresight. The purpose of both approaches is to bring a variety of people together in an open space to produce, evaluate or analyse futures-focused information and insights. Additionally, open innovation and collaborative foresight seek to elicit unexpected novel ideas and unorthodox couplings (Slaughter, 2002; Ramaswamy & Ozcan, 2018; Payán-Sánchez et al., 2021). There is also a clear link between CF and the systems view of innovation, as both research approaches highlight the importance of engagement with a broad range of actors, interactions and, more importantly, linkages between different systems (Fagerberg, 2018; Gloor et al., 2008).

The goal of CIOF is to collaborate to produce futures ideas and insights rather than develop common solutions, and new ideas and insights may be separately implemented in the participating organisations. While the dominant CF paradigm seeks to produce knowledge and alternatives for decision-making and for understanding and managing change (Heger & Boman, 2015; Daheim & Uerz, 2008; Rohrbeck et al. 2015), the present study addresses CIOF as operational-level future-focused cooperation involving managers, designers, planners and experts rather than executive-led strategic foresight (Schwarz et al., 2020). This approach captures the networked nature of cruise ship building and highlights futures-focused thinking and acting at the operational level. The content and substance in futures-focused thinking and acting is essential for analysing it and the content is meaningful also for identifying transformational experiments, which are seeds for long-term changes.

This collaborative account of foresight is grounded in the social constructionist exploration of social structures, roles and other abstract forms of futures-focused practice (Gattringer et al., 2017; Weigand et al., 2014; Tuomi, 2019). The constructionist perspective focuses on cooperation and pursues a deep understanding through involvement with contextual realities. The approach adopted here is informed by Tuomi's (2019) ideas about design-oriented foresight as a context-dependent process involving multi-voiced actors and processes. In this view, the purpose of foresight is to generate experiments and actionable insights that inform strategic decision-making, responsible action and innovation. Linking social relations and operational perspectives to the constructivist approach, collaborative foresight is seen as creating futures through dialogical interaction in a given context. Tuomi (2019) explained the ontological assumption of constructivist foresight 'in terms of observer modalities

of interaction and the interaction modalities of the observed system, which jointly define the ontological reality' (p. 9).

CIOF is grounded in an interactionist perspective that emphasises social relations and interpersonal processing as key elements of foresight actions (Mische, 2009) that play significant roles in how futures are explored and constructed. Collaborative foresight contexts have been variously described in terms of operational 'real-time foresight', bottom-up strategy planning, seeking consensus on long-term direction of development and broadening ideation (Weber et al., 2015; Weigand et al., 2014; Gattringer & Wiener, 2020). In interorganisational settings, foresight activities take the form of social relations and interactions, such as the flow of insights between actors. The present study examines interactions around cruise ship ideation as instances of what Tuomi (2019) characterised as design-type foresight. The account of cruise ship concept design in Section 2.2.1 links the initial planning process to ideation and concept creation.

The interactionist perspective links to the current FS discourse on anticipation. The dissertation loosely follows this anticipation paradigm, in which CIOF is viewed as generating futures rather than striving to predict the future or constructing discrete alternatives (Poli, 2017). In this view, futures knowledge or insights are created through interaction in social spaces such as networks. While insight construction is seen as an element of strategic thinking, it is considered to be a nonlinear, often tacit and intuitive form of circular knowledge (Miller, 2018; Bell, 2004; Malaska, 2000; Mische, 2009).

In sociological research, anticipation studies currently emphasise agency as a futures-focused dimension of social interaction, invoking the concept of a *future imaginary* as a component of that agency. Future imaginaries are defined as points of view or working theories about the future or as visions or projections of how a future will emerge (Mische, 2009; 2014; Miller, 2014). These have consequences for present actions and decisions based on elements that people can imagine in the present moment (Mische, 2009; Tavory & Eliasoph, 2013). I use the concept of *futures images* rather than imaginaries to describe collectively held assumptions and projections (see Article IV). While imaginaries and images are close in meaning, futures image*s* are closer to the FS tradition and relate explicitly to the future, while imaginaries encompass both present and past (Minkkinen, 2020). Futures images form a key defining aspect in FS, and the importance of futures images in present decision-making and informed action planning is widely agreed upon amongst futures researchers (Voros, 2007).

The practice perspective on CF has its origins in theories of social practice, which emphasise design thinking and practice-based interventions (Tuomi, 2019; Hoolohan & Browne, 2018; Iden et al., 2017). Regarding CIOF, the practice perspective

describes dynamic and open systems for ideation that involve action-based projections of the future in a social context. The complex nature of practice-based CIOF highlights the role of several underpinning theories, including evolutionary innovation, actor-network theory, theories of cooperation and participation, and futures-focused methods and techniques (Havas & Weber, 2017). The principal contribution of this perspective is to frame contextual challenges, such as sustainability enhancement.

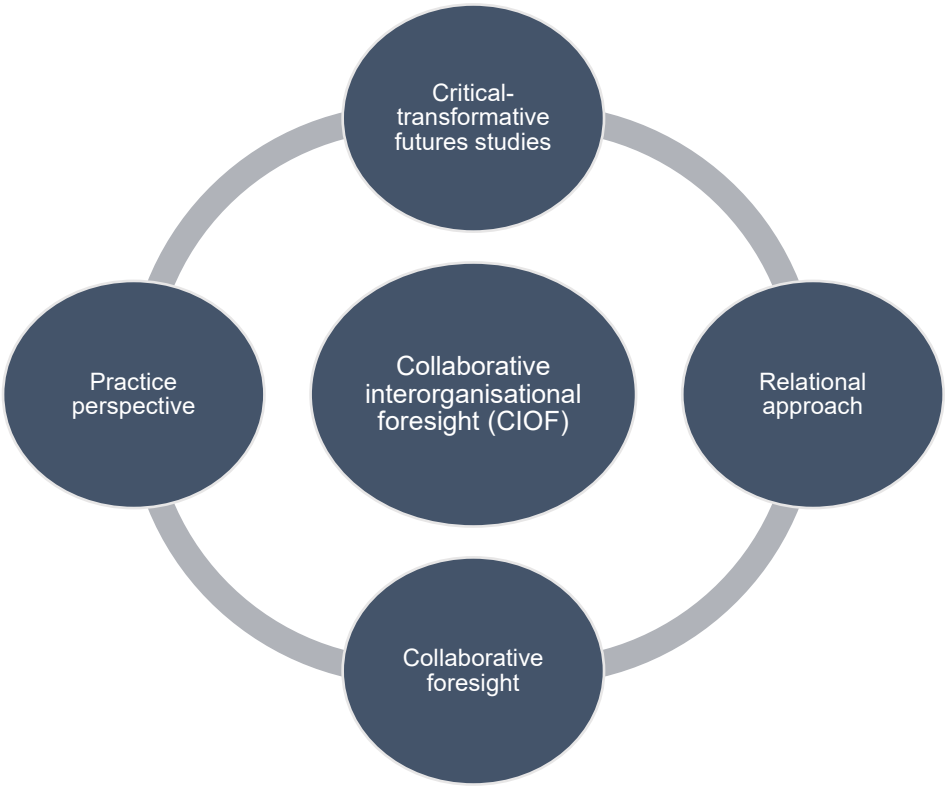

Figure 2. Theoretical perspectives.

The theoretical premises of CIOF are elaborated upon and further discussed below in relation to the present context (Sections 2.2.2 and 2.2.3).

2.2 Relational and practical perspectives on CIOF

In discussing CIOF in the context of cruise ship concept ideation, Gattringer et al.'s (2017) definition of collaborative foresight is deemed appropriate because it emphasises interaction and joint knowledge creation as key elements of foresight activities. Gattringer et al. (2017) defined collaborative foresight as

> *A discussion and analysis process of a few organizations concerning future developments in specific search fields which are relevant for the participating organizations and wherein issues related to future individual strategy and innovation options are collectively considered. Thereby the joint creation of future knowledge and "out-of-the-box-thinking" are important objectives. The results are used by each organization for further individual deliberations.* (p. 298)

This study explores CIOF in cruise ship building from three main perspectives: an overall view of the concept planning process, a historical view of Finnish cruise ship concept ideation and the nature of collaborative sustainability enhancement in the early stage of the shipbuilding process. The emphasis on social relations and operational issues helps situate the study within the theoretical discourse on CIOF.

2.2.1 Ship concept ideation as a component of CIOF

In modern cruise ship concept development, key questions include how best to integrate the activities of interorganisational partners and how to link the various elements of concept development to other elements of the shipbuilding process (Keiramo et al., 2018). CIOF provides a general framework for understanding the futures-related functions of social processes in interorganisational partnerships, with particular regard to context-driven issues and insight creation (Piirainen & Gonzalez, 2015). The CIOF framework (see Section 2.2.3) is used here to explore alternative and potentially desirable futures when developing new cruise ship ideas. The foresight dimension of the process encompasses information usage, FS methods, people and networks, organising and integrating processes, and cultural aspects of foresight activities. Rohrbeck (2011) offered a useful account of the structural and cultural aspects of foresight.

At the beginning of the vision phase, possible long-term futures are analysed and ideas are gathered as part of a collaborative foresight process analogous to the environmental scanning, information usage and networking elements described in Rohrbeck et al.'s (2015) corporate maturity model. The concept design process is a structured collaborative endeavour to synchronize ship architecture and technologies in a disciplined way, enabling transparent knowledge sharing among multiple part-

ners. In fostering transparent communication, multiple collaborations and interactions between teams and management, these actions illuminate foresight organisation and culture (Rohrbeck et al., 2015). The collaborative perspective on foresight highlights the importance of value co-creation and collaboration across organisational borders for collaborative relationships to provide access to new insights and joint complementary skills and capacities (Daheim & Uerz, 2008; von der Gracht et al., 2010). The role of CIOF in cruise ship concept development is further discussed in Section 2.2.3.

Concept ideation for a new ship is a structured, quality-driven collaborative process that leaves room for a creative approach (Keiramo et al., 2018). The concept design process and designers' vision are two of the most important factors in the evolution of cruise ship building. For prototype vessels in particular, the initial planning phase invites innovation and affords an opportunity to introduce fresh ideas. Modern cruise ships are typically described as floating hotels or, more recently, as floating resorts that imitate their land-based counterparts, with amenities that include restaurants, bars, sports facilities, shopping centres and entertainment venues (Ahola & Murto, 2018). Ideation for concept design involves brainstorming within an interorganisational community to envision the principal elements of the new cruise ship concept. This ideation phase can be viewed as a form of collaborative foresight action (Keiramo, 2021).

In a contemporary twist on traditional linear concept planning, the double spiral approach (see Figure 3) links the vision phase to the other phases of the new ship concept design (Keiramo et al., 2018). In this integrative and flexible process, multiple interorganisational teams of technical specialists, architects, designers, futurists and suppliers contribute to different design work streams, including technical design, safety, financials, risk management, quality control and resource management. The content of a cruise ship concept is multi-layered and details each element of the concept before production commences.

As shown in Figure 3, the concept design work stream must pass through check points CP1…n and quality gates QG1…n before proceeding to the next cycle. In cruise ship design, the principal work streams relate to the ship exterior, ship performance studies, accommodation, technologies, public venues and logistical flows, economics, safety, quality, risk and resource management. Partners in the concept design process generate alternative designs by engaging in a cycle of consecutive steps that begins with information gathering and idea generation and includes problem definition, sharing solutions, developing ideas for generating design alternatives, and evaluating and selecting the best solutions.

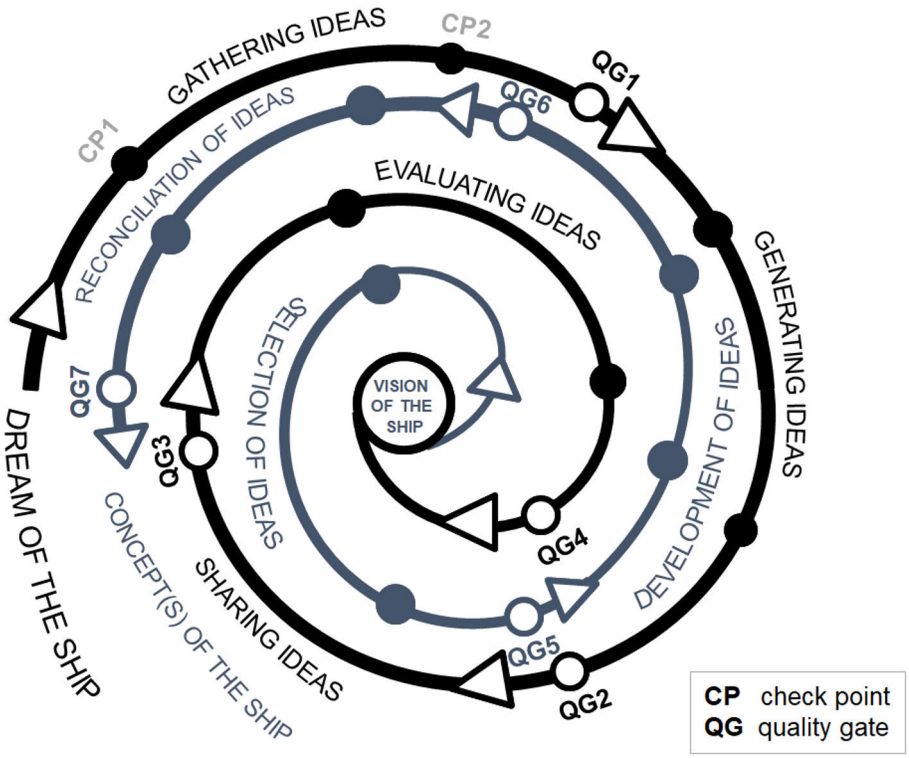

Figure 3. The contemporary design model: guiding the integrative path from vision to concept (Keiramo et al., 2018).

Within the concept design process, collaborative partnerships engage in foresight-driven operations to develop a joint vision for areas that include sustainability enhancement and strategic alignment. CIOF drives innovation to co-create new sources of value by confronting ideas and practices, combining resources and technologies, and creating synergies (Miranda Pérez-Rodríguez et al., 2019). As the approach to CIOF within a given network is apparently less widely researched than open innovation systems, it is fruitful to explore in more depth how foresight activities contribute to the design of complex products such as cruise ships. The next section discusses theoretical perspectives on actor relationships in the context of collaborative foresight.

2.2.2 A relational approach to collaborative foresight

To explore the relations between actors, objects and contexts in constructing knowledge and envisioning futures, the present study was grounded in a relational

approach that typically focuses on collaborative/constructive foresight, foresight actions and anticipation communities (Tuomi, 2019; Mastio & Dovey, 2021; Kurki, 2020). Philosophically, this approach is grounded in relational sociology, which explores the dynamics of social interactions in different settings (Emirbayer, 1997). Within the FS tradition, it is a fundamental principle that the future is shaped by social processes (Bell, 2004). The present study contends that analysing the role of social relations and interactions in collaborative futures thinking and acting in a given context can deepen our understanding of the socio-cultural and communications elements of CF and associated context-specific practices.

Theoretical studies of collaborative foresight stress its multiple roles and confirm that the interorganisational community's natural role is to generate ideas for further development (van der Duin et al., 2014; Gattringer & Wiener, 2020). Individual ideas about possible futures are not constructed in a vacuum; rather, they emerge through dialogue with others in a given social context (van der Duin et al., 2014; Baer et al., 2015; Könnölä, 2012). The present study argues that actors' relationships serve as a useful point of entry for exploring informal foresight activities (such as incubation of insights and innovations) at the operational level among managers, designers, planners and experts (including interorganisational experts). On that basis, the term 'collaborative foresight' is used here to refer to actors' social relations.

The proposed relational approach provides a deeper socio-theoretical basis for FS and links to critical social theory by showing how future projections develop through communication and interaction within groups, organisations and institutional settings. When applied to CF, this emphasis on context, positionality and actors' relations facilitates the exploration of knowledge frames in their specific context (Mische, 2014; Ahlqvist & Uotila, 2020) as actors engage in critical and reflexive dialogue on possible, probable and preferable futures. The collaborative foresight framework highlights the role of these foresight forums or spaces in generating insights and futures ideas in interorganisational settings. As a recent development in this area (Mastio & Dovey, 2021), the process of collaborative foresight is understood as a shared responsibility that complements managerial practice.

To consolidate the exploration of actor relations in a specific context, the study employs SNA to capture actors' social positions and roles in collaborative spaces. Social networks can be understood as spaces in which imagined futures are shaped by actions and interactions (Mische, 2009). Although there are many network-based studies of collaborative innovation and value co-creation (e.g. Heger & Boman, 2015; van der Duin et al., 2014; Gloor et al., 2008) individual social connections within the maritime industry have received less attention. The relevant literature examines knowledge flow structures, interpersonal trust and co-operation (Borgatti et al., 2009) and identifies knowledge brokers, mediators, translators and transmitters as significant social roles in the context of collaborative foresight (Sverrisson, 2001).

This collaboration is linked to organisation-level interactions that ground collective agency and enhance complex changes, such as sustainability transitions (Köhler et al., 2019; Kivimaa et al., 2019; Xue et al., 2014; Rupo et al., 2018). Adopting a relational approach made it possible to explore the construction of futures images in interorganisational networks at a practical level as part of a collaborative CF process.

2.2.3 Corporate foresight: A practical perspective

By combining practical, collaborative and relational perspectives, actions, opportunities and sharing of futures ideas can be identified as key aspects of operational foresight. As the practical perspective extends beyond formal foresight systems, the term *forward-looking* is used here to describe flexible long-term thinking and acting and the dynamic nature of humans' future orientations, following Havas and Weber (2017). Forward-looking actions are understood as future perceptions, creative thoughts and indeterminate perceptions of multiple future possibilities and their applications (Haegeman et al., 2012; Seginer, 2009; Cuhls, 2003; Weber et al., 2015). In interorganisational settings, collaborative foresight is embedded in everyday practices and informal approaches to futures-focused development in social networks or in other social relations (Tapinos & Pyper, 2018; Lee et al., 2018).

In the contemporary CF literature, a 'practice turn' emphasizes enactment and methods of evaluating, examining and exploring foresight practices (Rowland & Spaniol, 2020; Weber et al., 2015; Tapinos & Pyper, 2018). Foresight practices are considered to involve the normative and transformative use of futures visions and experimental learning-by-doing, rather than depending solely on foresight systems or formal FS methods. This practical view of CF acknowledges that imagining the future is embedded in workers' operational actions and daily lives, especially when setting objectives or solving problems (Gordon et al., 2020). This view is historically rooted in the tradition of participatory foresight, and especially in ideas of deliberative futures-making and futures workshop methodology (Jungk & Mullert, 1987; Dufva & Ahlqvist, 2015; Havas & Weber, 2017). The participatory futures view challenges the idea that futures actions are manager- or expert-led and instead highlights the role of broad and open participation paralleling open innovation. From a relational perspective, collaborative foresight as a participatory process is characterised by diversity and inclusivity, encompassing actors beyond organisational borders and facilitating co-development in areas such as sustainability enhancement or the construction of futures images.

The practice perspective stresses that foresight actions need not be part of a structured foresight process such as Rohrbeck's CF maturity model (Rohrbeck et al., 2015). Instead, foresight actions are creative, indeterminate perceptions of multiple possible futures in open-ended contexts (such as cruise ship concept design). In the

case of cruise ship concept design, informal practical foresight actions can be occasional workshops on trends, futures experts' lectures, participation in futures-related projects, reading of industrial associations newsletters and visits to field-specific fairs or conferences (e.g. Sea Trade Cruise Global). In this view, collaborative foresight involves actions at the periphery of practical vision, inspiration and open innovation, beyond the limitations of set beliefs. In characterising the dynamics of practical foresight as forward-looking and possibly vague or unconscious, this dissertation acknowledges the need for transparent analysis of how such actions are performed in social settings.

The relational and practical perspectives render these dynamic phenomena accessible to qualitative analysis in pursuit of a clearer understanding of foresight operations at the operational level. This approach supports abductive reasoning (see Section 3.2) and iterative deepening of interpretations of how futures ideas and insights evolve, guiding methodological choices and structuring the complex reality of futures-focused collaborative actions. The next chapter describes the methods used in the dissertation articles.

3 Methods

This chapter describes the study context and discusses the strategy used to analyse the social structures bearing on collaborative foresight. Methodological choices are explained and linked to the theoretical approach.

3.1 Overview of the context

The target phenomenon (the concept design process) was first addressed by examining the development of Finnish cruise ship building. Article I constructs a general picture of concept design and collaborative planning within a collaborative and integrated design process characterised by distributed leadership and collaborative foresight. The study focuses on the cruise ship building community in the Turku region and its future challenges.

Article II discusses key turning points in the evolution of concept design from a historical perspective, the role of ideation and the networks involved, including designers, architects and other experts. This historical approach captures key influences from the 1960s to the present, including ships, process innovations and actors that have contributed to the reputation of Finnish-built ships as modern and innovative products.

The dissertation also examines sustainability enhancement in a publicly funded project consortium comprising the lead company, first-tier and second-tier companies, a potential supplier company and two consultant companies. The research partners were the University of Turku (Department of Future Technologies, Finland Futures Research Centre and Centre for Collaborative Research) and the Technical Research Centre of Finland Ltd. [VTT]. The project consortium also included three supporting partners representing an industrial association and suppliers. The lead company in the shipbuilding network produces luxury cruise ships and retains about 1,500 employees and a vast network of suppliers.

The research context of Articles III and IV is the joint publicly funded business-academia project referred to above. Article III focuses on the social network of project actors and their roles in incorporating new sustainability ideas into the building process. Article IV describes the futures images of sustainability enhancement and the collaborative construction of these images.

3.2 Methodological principles and choices

The dissertation process is transdisciplinary, combining engineering design, conceptual history and FS perspectives. Based on the theoretical starting point of practical and relational approaches to collaborative foresight, the choice of methodology had to be compatible with critical-transformative individual and group-level reflections. This plurality of theoretical perspectives and the complexity of cruise ship concept development meant that a range of methods was needed to capture the structure of collaborative ideation and development targets. The study relied on a mixed methods design (Plano Clark & Creswell, 2008), using complementary quantitative and qualitative data collection and analysis techniques. This strategy of using complementary methods for triangulating the investigated phenomena provided an adequate basis for conducting the study in a systematic and rigorous way (Axinn & Pearce, 2006).

The study is based on abductive reasoning, which seeks out new perspectives, observations and interpretations rather than explicit causalities or theories (Meyer, 2016; Tavory, 2018). At the operational level, collaborative foresight is a reflexive practice in which multiple actors explore and reflect on uncertain futures (Weigand et al., 2014; Hines et al., 2017). The collaborative foresight framework and relational perspective define the premises for thematic analysis and clustering of empirical data. Identifying the dimensions and scope of collaborative foresight practices is an abductive process of analysing social structures and patterns for future enactment.

The future's ontological character is understood here as a co-existing multiplicity of plural and single futures images. Rowland and Spaniol (2020) described multiplicity as,

> *An ontological form of 'being' (or existence) that is encapsulated by the phrase 'more than one, less than many'. It is an efficient phrase indicating that any outwardly visible singularity is also an assemblage composed of many but not an infinite number of component parts variously lashed together* (p. 559).

The present study highlights the meaningfulness of different contexts and actors' perspectives as alternative ways of seeing futures. However, the future exists in a single mode when, for example, sustainability targets are enacted and actors envision sustainable transformation. In the present context, multiplicity means observing, rather than erasing, the complexity of collaborative network constructions of the future.

The futures-focused practices introduced in Section 2.2.3 are seen in terms of 'use futures' as a component of the anticipation paradigm (Poli, 2017; Miller, 2015), which refers to multiple ways of enacting ideas about the future (e.g. envisioning, construction of futures images, idea generation and reflections). Miller (2015) re-

ferred to two broad ways in which people make assumptions about the future: *emergent* (implying a need to understand novel and dynamic complexities) and *anticipation* (implying more linear thinking, such as knowing about trends, creating scenarios or imagining preferable futures). While the present study accommodates both models in exploring how actors use futures in collaborative group contexts, the emergent model is of particular interest here because it meets the practical and capability challenges of CIOF"

3.2.1 Research integrity

Strategic interorganisational foresight is a sensitive area, as the open exchange of insights may violate business secrets and/or trust-based relationships. While futures-focused thinking and acting necessarily involve uncertainty and diverse possibilities, ethical and moral challenges nevertheless arise; thus, research integrity is important in joint project environments. In the present case, the project consortium followed the guidelines and code of conduct set by the funding agency Business Finland (www.businessfinland.fi), and these guidelines and partnership and research agreements defined the standards for cooperation and research activity.

The working environment for co-authored studies was built on active, inspiring and open cooperation. In practice, this involved regular meetings to discuss research issues and analyses. During the publication process, every contributing researcher commented on the manuscripts across several rounds, and everyone had access to any communication between the first author and the publisher. The articles in this dissertation were published in peer-reviewed journals that assessed their research integrity, and sources of financing and conflicts of interest were declared in each case.

The research process adhered to the principles of accurate, valid and reliable research. The data gathered in interviews and workshops were recorded, transcribed, analysed, presented and evaluated to confirm the research findings and adherence to scientific criteria. In addition, the transparency of data acquisition ensured the ethical sustainability of the process. Data management plans were made and agreed upon within the research teams, and interview transcripts in Article II were anonymized and secured for research use only (ISBN978-952-64-9604-7, 2020, Aalto University). The interview data from Studies III and IV were destroyed; however, the transcripts are stored in the University of Turku research archives. Finally, all partners in each research project agreed on their mutual rights, responsibilities and obligations at the beginning of the research process.

3.2.2 Empirical setting

The main empirical context was a joint business-academia project that sought to enhance the sustainability of cruise ship construction. The research focused on collaborative foresight actions in a shipbuilding network. This setting was selected to deepen the understanding of everyday processes at the operational level through practical and robust methodological development, rather than to develop theory or generalisable models. The joint project commenced in 2016 and continued in two phases until 2019. The lead partner made a strategic decision to enhance construction process sustainability, and the central aim of the partnership was to elicit reflections on the role of sustainability within the supplier network. The main informants were consortium company partners who participated in the interviews and workshops, and those data were supplemented by project meeting minutes and notes.

Articles I and II addressed the ship planning process in general, including key turning points and innovations in processes and outcomes. Articles III and IV adopted an action research approach to data gathering, which involved close collaboration with the project partners. These studies also addressed the issue of sustainability enhancement within the network. In FS, the constructive paradigm stresses the importance of the interaction between informants and researchers in shaping future-focused actions. In this regard, the principles of action research served more as a general framework than as a strict methodology (see, for example, Boda, 2018). The studies reported in Articles III and IV drew on notes and other material from meetings, as well as field notes, recordings, transcripts, sustainability literature and reports, internal company documents, academic case studies and news reports. Other elements of the procedure included iterative discussions within the consortium and the wider academic community (e.g. stakeholders, conference attendees and experts in the field).

The validity of this research depends on the rigour and relevance of the information produced regarding practice-oriented foresight activities and methods. To that end, the selected context was explored from different angles, and the research was grounded in interaction to acquire detailed and rich information. In terms of theoretical maturity, the proposed collaborative foresight framework remains a work in progress, and a more coherent theory would strengthen the validity of the data interpretation. The progressive and iterative use of interviews and workshops compensated, to some extent, for this theoretical immaturity.

3.3 Collaborative futures: Interviews, SNA and workshops

The study drew on analytical techniques typically associated with futures-focused practices in ship ideation and/or development. Rather than relying on a comprehensive theory or a coherent set of concepts, the aim was to identify tools for analysing practice-oriented foresight in terms of the flow of futures insights, social structures and workshop activities. From the wide range of futures research methods, the critical-transformative approach adopted here acknowledges the study's normative and transformative underpinnings. These methods can be applied across FS paradigms – for example, workshops can be used in both constructivist and analytical contexts. The next section describes the methods used in the study and assesses their validity.

3.3.1 Semi-structured interviews

The semi-structured interview method was used to gather data on (a) the historical development of ship concept design and pivotal designers/planners and (b) sustainability enhancement. Interviewing is a qualitative and interpretative method for gaining a deep and comprehensive understanding of a specific research topic, instead of just sticking with a broad overview (Lichtman, 2017). Here, the aim of the interviews was to identify and unravel the underlying meanings and ideas behind individual interviewees' insights on concept design and sustainability enhancement. The practical research design directed the number and length of the interviews, and the co-writers agreed on the questions. A professional agency created the transcriptions, which the researchers checked for accuracy. Special attention was paid to rigorous data-gathering methods to ensure the validity and reliability of the study.

In Article II, retrospective semi-structured face-to-face interviews and SNA were used to identify the central actors and their relationships. Retrospective analysis, which traces long-term development, was used to explore the links between the experts by identifying the most forward-looking steps in the concept design process. The interviews used name generation to map network actors and the snowball sample until satisfactory saturation was met (Yousefi Nooraie et al., 2020). Details of the interview process, sample and interviewees can be found in Appendix 1.

Articles III and IV used the same interview data collected during the business-academia project. The semi-structured interview data were collected from 70 company informants and key stakeholders, both women and men, in two stages. The company interviewees were selected from major departments that included procurement, sales and design, human resources, environmental management, administration, HSE (health, safety and environment) and risk management, investments and ICT (information and communication technology). Interviews with customers and

supply chain representatives provided information on sustainability practices and reflections on the role of sustainability in the field. Both rounds of interviews followed a similar protocol; details of the interview process and analysis can be found in Appendix 2.

The data from the semi-structured interviews were used for constructing futures images in Article IV. A content-based analysis was performed using the data obtained from the semi-structured interviews to construct futures images. The analytical process proceeded from several rounds of reading the transcripts to coding the content according to repeating themes. The first round of coding was based on sustainability dimensions, and the second round identified the main themes under the dimensions describing the interviewees' visions and insights on sustainability enhancement in the future. The far future was defined as 10 or more years ahead. The main themes identified were (1) economy and competition, (2) customers, (3) local economy and (4) sustainability development. In the final round of analysis, codes were written in descriptive form to follow the ideas that appeared in the interviews.

The validity of the interview process is the study's main strength; semi-structured interviews benefit from the structure provided by themes from the literature and the researcher's expertise, while also accommodating the flexibility and authenticity of the informant's reasoning (Miles & Huberman, 1994). The thinking patterns were identified through the data familiarisation, coding, theme development and iteration process. Elements of the reflexive thematic analysis were used in the interpretative process to identify the patterns of thinking, the sense of agency, intention and interests. A realist approach to the thematic analysis was chosen, as the focus was on reporting the reality and ideas of the interviewees (Braun & Clarke, 2019). In Articles II, III and IV, collaborative categorisation and iterative coding enhanced the validity of the data. Additionally, cross-checking, independent analysis and agreed interview questions and templates increased the validity of captured memories, practices and perceptions of the complex phenomenon of shipbuilding. The dataset was sufficiently large to support some generalisations regarding the issues mentioned in multiple interviews.

3.3.2 Social network analysis

Compared to more traditional statistical analyses, SNA is considered appropriate for analysing relational data that connects one agent to another through their contacts, ties and group attachments. The study employed SNA to identify key actors, including those who have influenced cruise ship concept design (Article II) and those who have driven sustainability development (Article III). The main purpose of using SNA in Articles II and III was to analyse a social space for agency as insight sharing within

a network and to examine an individual's influence and abilities to initiate or implement change on futures-focused development, e.g. in sustainability enhancement. The SNA methodology offers an intuitive visualisation of a network structure, which can be used, for example, to evaluate information flow, determine social hierarchies and influence relationships. Using SNA adds a means to discuss, for example, organisational change, individuals' roles, the dynamics of decentralised structures and distributed leadership; see Froehlich et al. (2019) for the utilisation of SNA in mixed methods research.

Density, centrality and centralisation measures were calculated for the data. All SNA metrics were conducted using UCINET software (Harvard, MA: Analytic Technologies), which is a general SNA package. Density, which is a basic concept in SNA, was analysed to determine how many nominations the respondents reported compared to the maximal number of nominations. The more nominations they reported, the denser the network (Borgatti et al., 2002). Centrality indicates how many direct connections there are between each node and the other nodes within the network. The analysis of social relations will assist collaborative networks in their efforts to have productive dialogue and co-create value for company sustainability, extending far into the future. The individual perspective was relevant here because, based on the social network paradigm emphasising informal relationships, it was assumed that an individual can have influence and a strong impact within a network beyond one's formal organisational position (Palonen & Froehlich, 2019, p. 87–88).

In Article II, the name generator technique (Burt et al., 2012) used for data gathering was based on free recall questions that helped the interviewees remember as many names as possible. Designed to identify social resources embedded in specific content areas of the actor network (Marsden, 2002), this technique elicited only a fraction of the respondents' social contacts. The dataset in Article II involved 16 interviewees and 79 persons nominated as pivotal actors in concept design. To begin gathering data, the researchers selected four pioneers in the field. Using the snowball method, these key individuals were then asked to identify other people involved in the concept design. Eight persons currently working in the field were identified, along with four subcontractor representatives. Based on interview data, the SNA in Article II used NVivo12 software to categorise the content related to prominent actors, as visualised by Cytoscape 3.8.0.

Article III analysed the project network as a whole based on the responses of a social network survey. The data in Article III were collected via a social networking questionnaire that included a roster from the project participants (Wasserman & Faust, 1994). The questions (see Appendix 3) were distributed to the 41 interviewees among the case network members and project partners, yielding a response rate of 80%. The network data were collected using a list, where the first column presented a list of the names and the other columns indicated the three network dimensions

(cooperation, trust and advice). These three network dimensions were examined. Additionally, respondents were asked to name other sources of insight into sustainability and its implications, as well as whom they considered forerunners within sustainability in other fields or businesses. The network survey also had two open-ended questions, which were designed to gather information related to such forerunners and collaborators who were not project partners but represented another party or organisation. The additional information collected was sources other than the project participants, from whom they derived insights on sustainability and its implications and who they considered forerunners within sustainability in all fields or businesses. The questionnaire collected the participants' personal information, such as their name and employment organisation. Other complementary attributes were received from the project organisation.

The analysis in Article III covered interactions on sustainability among the partners, addressing the overall structure of the network, individual network positions, mediator- and boundary-crossing roles, and the relationships between project actors (as well as their formal positions). To analyse the participants' ties, values were calculated for in-degree, out-degree and reciprocal ties. The in-degree values refer to the number of ties directed towards a participant, thus being peer reports, while out-degree values indicate the number of connections that the responder him/herself reported (Wasserman & Faust, 1994, p. 175). A nonmetric multidimensional scaling (MDS) analysis was applied to the data matrix with UCINET 6 to make the network ties visible and to distinguish possible subgroups within the network. The visualisation of MDS was based on the symmetrised adjacency matrix, based on maximum criteria, where connection has been observed if at least the other actor in the dyad has reported a tie (Borgatti et al., 2013, p. 91). The network visualisation represented how participants interacted or collaborated with one another. The shorter the distance between the two actors in the MDS map, the more closely they interacted. The results in Article III described the relationships of the actors, that is, the in-coming/out-going of ties in addition to the density of the network. Additionally, the visualisation of the subgroups is presented in a dendrogram of hierarchical clusters.

The analysis highlights the importance of measurement in a relational account of collaborative foresight practices (Mische, 2014). The validity of the analysis depends on the representativeness of informants and on the use of appropriate methods to capture non-hierarchical interactions and transfer futures insights. While network data are typically at risk of bias (such as focusing on the most prominent actors), it is reasonable to conclude that, for heuristic purposes, SNA – as used here – provides an adequate account of the social aspects of collaborative foresight. The methodological implications of adopting a mixed method SNA strategy enabled the acquisition of a quantitative and qualitative understanding of the examined social networks.

SNA can provide a rich picture of relationships among project participants, as it can be employed at the dyad level. This kind of mixed methods SNA can be helpful in bridging personal and structural dimensions in an organisational context (Palonen & Froehlich, 2019).

3.3.3 Workshop method for interactive data gathering

The dissertation employed the workshop method for data gathering rather than for future construction. The futures workshop is a formal method with its own tradition (Jungk & Mullert, 1987), but the purpose of these workshops was to examine interactive futures talk. This approach accommodates both narrative and interactionist approaches to the construction of futures images in a communicative setting analogous to what Mische (2014) characterised as a space for 'hyperprojectivity'. The purpose of the workshops was to explicate assumptions about collaborative ideation and to develop new ideas for sustainability practices in cruise ship building. The aim of using the workshop method for data gathering was to discover the dynamics of insight sharing and complete the interview data for futures images (Kelliher & Byrne, 2015; Rowland & Spaniol, 2020).

The two workshops, which were used for iterations of ideas on sustainability enhancement, aimed to reveal how futures-focused dialogue emerges in a particular social setting. An underlying assumption was that the ideas from the interviews were taken further in the workshops and moved towards long-term preferable futures. The timeframe used for the projected future in both workshops was about 10 years, until 2030. The workshops were organised as a part of a business-academia project and they took place on university premises. The academic project partners facilitated these workshops and they planned and agreed on the workshop procedure.

The workshop process involved two phases. The goals of the first phase were to map sustainability themes, strengthen ownership of the broad themes raised in the interviews and initiate futures-focused discussions with outsiders beyond the project consortium. The second phase aimed to develop a collaborative space for constructing visions and images of the future. The workshop discussions were loosely structured by topic and were conducted in small groups of three to four people. Supported by a facilitator, the manageable group size allowed for clarification and discussion of different viewpoints, interests and expertise.

The data from consecutive workshops included transcripts and video footage of thematic discussions within the groups, as well as facilitators' flipchart notes. Group discussions were analysed to identify content and interactions that produced new ideas and developed key themes. In total, 12 themes (e.g. sustainability standards, indicators and reporting; social sustainability and the workforce; external sustaina-

bility requirements and expectations; project and time management; ways of collaborating; and environmental aspects of sustainability) that derived from the interviews in Articles III and IV were discussed as the basis for futures images, changes and reflections on the consequences of enhanced sustainability. The workshop participants included hand-picked representatives from organisations in the project consortium and academics interested in the maritime industry. In total, 31 people participated in the two workshops during 2018.

The analysis of the data from the workshops employed a framework constructed for this purpose. The frame was designed to mediate between interview and workshop data from Articles III and IV and explicate the content, timescale, sociality and resonance of futures images.

Table 1. A futures images framework for analysing workshop discussions.

RANGE OF ALTERNATIVES	TIMESCALE	SOCIALITY	RESONANCE
Versatility of futures images	Short 1–2 y	Actors	Reformulated opportunities and actions
	Medium 3–5 y	Relations	
	Long 6–10 y	Interactions	
	Far > 10 y		

The interview data clarify the future sustainability issues which were elaborated on in the workshops and, in turn, clarify how the interactive discussions contribute to visions of sustainability enhancement. Based on the analytical frame, the transcripts and video footage of workshop discussions were coded using NVivo 12 to explicate the structure of futures images and to capture the dimensions of collaborative talk and interaction in the workshop setting.

The validity of the workshop data and analysis is determined by how well these capture the interactive aspects of futures images construction, which in turn depends on skilled facilitation to create an open, friendly and constructive atmosphere in the workshops. The facilitators were familiar to most of the participants, and most of the participants also knew each other, as the workshops took place in the later phase of the project. The discussion transcripts and video footage increased the validity of the interpretation by clarifying the nuances of the talk, and the researchers' collaboration strengthened the validity of the analysis.

3.3.4 Supporting methods: Field observations and notes

Articles III and IV included field observations from the project meetings, research seminars and steering group meetings. The meeting minutes (recorded by the project manager) were analysed to augment the background knowledge and understanding of the context for subsequent data interpretation. At the project seminars, the researchers and corporate participants discussed the research findings, corporate development projects and issues arising, while questions related to project management were discussed at the steering group meetings. Other data from the nine project meetings included official minutes and research notes prepared by the academic partners.

Interviewer observations complemented the interview data. The researchers participated in all project meetings in which direct interaction with the corporate partners enriched the understanding of the business network. In addition, notes taken in the workshop observations added to the richness and validity of the interpretations of the workshop dynamics.

3.4 Overview of theoretical and methodological frameworks

The study employed several data collection instruments and multiple methods to capture the early stages of ship development, augmenting the depth and reliability of the knowledge produced. The study as a whole focused on understanding the initial planning phase to identify themes that acted as coding frames for the subsequent analysis. This abductive approach and the use of rich qualitative methods are appropriate for capturing and analysing unfamiliar or complex phenomena.

The research design and methodology deliver substantive insights on collaborative foresight and highlight the role of social relations in exploring and constructing futures insights and visions as well as in broader collaborative contexts. Figure 4 presents the research process logic and the interconnections between the frameworks. Article I describes the contemporary concept design process and CF in this context. Article II gives an overview of Finnish cruise ship concept design and of innovations and pivotal actors in this context. Articles III and IV explore sustainability enhancement from the perspective of CIOF. In addition, Articles III and IV develop FS methods for capturing social structure in futures-focused collaboration.

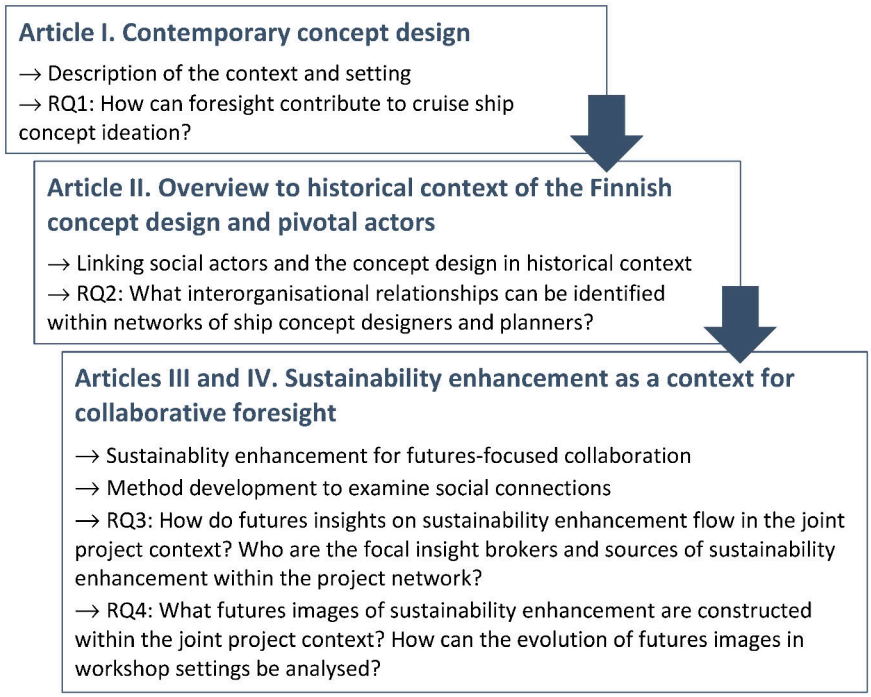

Figure 4. Research process and design.

Table 2 clarifies the research frameworks, data and methods as a whole. It relates the datasets and methods to the sub-studies and shows the types of research data and analytical methods linked to each dataset.

Table 2. Position of the original articles in the theoretical and methodological frameworks.

ARTICLE	FRAMEWORK	METHODS	DATA
I	Engineering design of a ship concept ideation	Conceptual study	Literature review
II	Historical descriptive study on cruise ship concept design	Semi-structured interviews SNA	16 Interviews
III	Forward-looking sustainability agency	Semi-structured interviews SNA	40 interviewees 41 survey respondents Minutes of project meetings Field notes Observations
IV	Inter-organisational collaborative foresight (CIOF)	Futures images Semi-structured interviews Workshop	40 interviewees 2 workshops 31 workshop participants

4 Overview of the Studies

This section provides a brief synopsis of each original study in the dissertation, including a discussion of its contribution to the understanding of collaborative foresight practices. Figure 4 situates the studies in relevant theoretical and methodological contexts.

4.1 Article I

Keiramo, M., Heikkilä, E., Jokinen, L., & Romanoff, J. (2018). A concept for collaborative and integrative process for cruise ship concept design – From vision to design by using double design spiral. In Kujala, P. & Lu, L. (eds.), *Marine Design XIII, 13th International Marine Design Conference* (p. 193–202). Taylor & Francis.

Modern cruise ship concept design is characterised by the ongoing demand for breakthrough solutions based on future-focused ideas produced in collaboration with suppliers and clients. This article discusses the conceptual frames that inform contemporary cruise ship concept design in inter-organisational contexts. The research approach forms part of the long-term continuous development of cruise ship conceptual design, and the article introduces a research concept that will be further developed in the next phases of the dissertation project. The study outlines frameworks for further research in this dissertation and in Marjo Keiramo's (2021) work on the concept design process.

The collaborative and relatively open concept ideation process is analysed here from three perspectives: design process, leadership and foresight. Adopting a systemic approach, the article elaborates a 'fit for purpose' collaborative model that synchronises human and technical systems for new concept ideation. The human system encompasses foresight processes, partnership culture and leadership, while the technical system focuses on the architectural and technical aspects of new product design. The proposed approach incorporates ideas from participatory and integrated design models (Keinonen & Takala, 2006), partnerships and distributed leadership (Heaslip, 2014) and foresight maturity (Rohrbeck, 2013).

Methodologically, this empirical research employs elements of case description and semi-structured interviews. The approach is multidisciplinary, combining different frameworks to capture the complex process of concept development and laying the ground for the subsequent use of SNA, content analysis and workshop observations later in the research process.

The article concludes that the ability of network actors to work together in an inter-organisational context depends on collaboration, interaction and the relationships between people. In a complex and extensive network like shipbuilding, futures thinking and creative ideation are intriguing topics because different actors are likely to have both shared and diverging goals at different points in the process or in relation to specific issues. Improving the process of collaborative concept ideation therefore depends on a fuller understanding of social structures in collaborative networks and their influence on futures-focused idea generation.

The study hypothesises that improving the collaborative concept design process to optimise efficiency while meeting cost and quality objectives depends, in part, on effective cooperation, which in turn depends on the relationships between different actors in different contexts. Looking through the lens of collaborative and practice-oriented CF, this article explores how futures-focused idea generation is socially structured and how creative partnerships are promoted. The article concludes that the key research question is how to develop a multidisciplinary approach that facilitates creative collaboration in new ship design. To that end, the authors link open research questions to relevant theoretical entry points.

4.2 Article II

Jokinen, L., Keiramo, M., Kivist, P., & Palonen, T. (2020). Past, present and futures of cruise ship concept design: From the perspective of the Finnish cruise ship industry. Merenkulun riskit ja resurssit. Nautica Fennica. Suomen merihistoriallinen yhdistys ry, Museovirasto [Finnish Heritage Agency].

The article documents Finnish shipyard actors' perspectives on cruise ship concept design and the early planning phase to provide an overview of notable ships, planning process innovations and actors that have contributed to the reputation of Finnish-built ships as modern and innovative. This article contributes to the discussion on the role of collaboration and key actors' forward-looking visions in concept development to clarify how collaboration is constructed at the social network level.

The nature of passenger ship traffic changed fundamentally in the 1960s, when the international cruise industry began to grow and leisure cruise products became available to the wider public. Cruise shipbuilding became a significant part of the maritime industry and an important import sector in Finland, whose shipyards were

among the first to build modern passenger ships designed exclusively for cruising. For that reason, the study focuses on cruise ships built in Finland from the 1960s to the present.

The concept design phase requires a range of innovative inputs from ship designers and other experts. Concept design and early planning have evolved from a sequential expert-led process towards a greater emphasis on customer needs, design maturity and quality, informed by a deeper understanding of costs and revenue optimisation. In these circumstances, effective and productive concept ideation increasingly depends on collaborative practices and group dynamics among the participating partners.

To construct an overview of the evolution of concept design since the 1960s, how design methods reflect business functions, and the key players in the field, the study examines futures thinking and acting from the practical perspective of development and applications. Rather than analysing foresight epistemology or processes (Piirainen & Gonzalez, 2015), the article focuses on forward-looking actions and the impacts of diverse methods in specific contexts. Theoretically, the study defines forward-looking concept design as a multitude of futures-focused actions and thinking within the open-ended domain of concept ideation, driving networked actions to create practical visions for new vessels (Havas & Weber, 2017; Weber et al., 2015).

To understand the role of personal characteristics and expertise in concept design, this descriptive research employed retrospective, semi-structured face-to-face interviews and SNA to describe the long-term development and relationships between the experts. This study identifies six significant turning points or breakthroughs in cruise ship concept development and highlights the importance of a few respected visionaries (and their teams or collaborators) who have played active and forward-looking roles. Notably, it seems that international architects and design agencies were the key actors in creating ship concepts, while Finnish players exhibited the necessary motivation and ability to respond actively to those visionary ideas. The collaboration has created employment continuity in the retention of stable design teams, preserving necessary knowledge capital and establishing long-term collaborative relationships.

4.3 Article III

Jokinen, L., Palonen, T., Kalliomäki, H., Apostol, O., & Heikkilä, K. (2020). Forward-looking sustainability agency for developing future cruise ships. *Sustainability,* 12(22), 1–20. https://doi.org/10.3390/su12229644

The article addresses the sharing of futures insights as a component of sustainability agency, focusing on long-term sustainability enhancement and how this is socially

constructed in an inter-organisational shipbuilding network. The research context is a joint partnership project involving firms, academics and non-governmental organisation (NGO) actors with an interest in cruise ship building and sustainable development.

The study explores sustainability agency from a practical forward-looking perspective, where the future is understood as contingent, open and shaped by individual and collective actions (Tapinos & Pyper, 2018). The role of relational agency is considered critical, as actors' interactions drive ideation for development and action (Burkitt, 2016). The study draws on the sustainability transition literature on the actions of intermediaries who initiate change and serve as a bridge for knowledge transfer (Kivimaa et al., 2019).

The mixed methods approach enriches SNA with other contextual data, such as meeting notes and observations. From the case network of partner organisations, 41 employees participated in the project as interviewees, steering group members, NGO partners or researchers. The network survey examined three network dimensions: collaboration, advice and trust. The results describe a loose and thin network structure in which trust among network actors was relatively high. This combination of high trust and weak density was seen to facilitate insight sharing among project actors. The lead company actors played a central role in enhancing sustainability, while the researchers and industrial association representatives contributed significantly more to insight sharing and transmission than the firm actors. The study concludes that futures insight sharing enhances agency and underpins practical foresight actions. The article highlights the promotion of proactive agency in network settings and shows how strategic aspects of managerial practice strengthen the discourse around sustainability agency.

4.4 Article IV

Jokinen, L., Mäkelä, M., Heikkilä, K., Apostol, O., Kalliomäki, H., & Saarni, J. (2022). Future images for constructing sustainable cruise ships. *Futures*, 135, 2873. https://doi.org/10.1016/j.futures.2021.102873

The article documents futures images of the sustainable cruise ship building industry as constructed by participants in the joint project and explores socially constructed and shared futures images for desirable and possible futures, including normative and strategic agendas. The research context is the joint industry-academia-NGO project on cruise ship sustainability development described in Article III.

The study adopts a critical social theory perspective on collaborative foresight and falls within the paradigm of critical-transformative FS. In this view, futures images are collectively held assumptions involving nonlinear causality, highlighting

the role of agency and the need for critical reflection on collectively constructed projections of possible futures (Jasanoff & Kim, 2015; Mische, 2009). Focusing on the actions, opportunities and sharing of futures ideas, this approach reflects the 'practice turn' in CF, which emphasises enactment and the methods used to evaluate, examine and explore those practices (Rowland & Spaniol, 2020; Weber et al., 2015; Tapinos & Pyper, 2018). The article also highlights the relational approach to CF, which emphasises context, positionality and actors' relationships, exploring knowledge frames in their context (Mische, 2014; Ahlqvist & Uotila, 2020).

Futures images work well as broad representations of alternative futures that are distant from the present and evoke the 'pull of the future' (Kuhmonen, 2017). The analytical frame developed in this study analyses futures images in four ways: by (1) capturing the range of alternative futures images related to a specific topic – in this case, sustainability enhancement – (2) setting a time horizon to determine the reach of futures images, (3) specifying the social context and (4) noting resonances in the workshop context. The research data comprised 40 interviews with 62 individuals, including shipyard personnel, suppliers and customers, as well as service providers and an industry association representative. To add a collaborative dimension to the construction of futures images, the two workshops brought together 31 case project actors, including project outsiders representing companies, academia and NGOs. The purpose of these workshops was to elaborate on the results of the interviews and to develop a vision for sustainable development in this sector.

The analysis identified four futures images: *money rules,* which stresses that every decision on sustainability development must make economic sense; *the customer is always right*, which puts emphasis on meeting customer demands and expectations and how each network member strives to meet the requirements; *the local economy focus* image, which emphasises the employee perspective, as employee safety and well-being are key components in sustainability enhancement; and *the most sustainable ships in the world*, which refers to the continuous development of all aspects of sustainability. The study shows how the content of futures images can be analysed to reveal the iterative reprocessing, reformulation and reorientation of imagined futures. Here, the findings indicate that overall foresight maturity is relatively weak when project partners' foresight processes and cultures are in the early stages of development. The observed deviations between companies on different dimensions of the maturity model (Rohrbeck, 2015) determine the operational context for practical foresight.

As an object of research, articulating and communicating futures images provide a basis for collaborative dialogue regarding how best to approach the uncertain and imperfectly knowable. The article contends that futures images can provide a basis for target setting and a frame for sustainability enhancement actions as an alternative to past sustainability performance data. The relational theory of futures knowledge

provides a deeper socio-theoretical foundation for FS and links to critical social theory by showing how future projections develop through communication and interaction within groups, organisations and institutional settings. This systematic analysis of futures images content provides a deeper and finer-grained understanding of how discussion flows across alternatives, timescales, social contexts and ideas for innovation and change.

4.5 Author's contribution

The author contributed to Article I by writing the foresight theory and systemic innovation elements; Sections 4.5 and 5 are mainly the author's contributions. All the authors worked together to agree on the content.

In Article II, the author played a leading role in developing the theory and methodology elements. The author collected most of the data and performed the analysis independently. The author wrote the foresight theory and SNA elements alone. Marjo Keiramo wrote the concept design section and Pauli Kivistö wrote the historical turning points section.

Article III was written entirely by the author, who also performed the SNA with technical assistance from Spindel Ltd. Katariina Heikkilä conducted the interviews, and the other authors commented on the text.

The author co-authored Article IV with Marileena Mäkelä, who wrote the draft futures images. The author also wrote the theory, workshop design and data analysis, while the other authors facilitated the workshops and commented on the article.

5 Main Findings and Discussion

5.1 Main findings

Since modern cruise ship building began in Finland in the early 1960s, the process of concept ideation has typically involved collaboration within a multi-professional community (Articles I and II). In contemporary engineering design, the concept design and planning process is multi-professional, interorganisational and collaborative. From a CF perspective, the dominant logics in concept ideation are context-based and open foresight, with a more diffuse role in trend-based foresight (Daheim & Uerz, 2008). In the near future, the concept ideation process is likely to become increasingly user-oriented and participatory, and joint envisioning within an interorganisational network will be a strategic goal (Keiramo, 2021). In the current collaborative and integrative design model (see Figure 3; see also Keiramo, 2021, p. 97), the concept design stage is pivotal in envisioning the principal elements of a new cruise ship and affords an opportunity to introduce new ideas and futures insights.

In this process, futures-focused ideation and the flow of insights are distributed across network actors. The shipping company specifies a general vision for the new ship. After the initial concept and specs are agreed with the ship owner and a production deal is agreed upon, design agencies work on concept ideation based on production yard examples and suppliers offer new future-focused ideas to the production yard. In this deeply intertwined process, future-focused ideas become part of the design and construction processes, both before the production deal and during planning and building. The CIOF perspective facilitates the analysis of futures thinking within this process and strengthens the evaluation of different partners' impacts.

To clarify how future-focused ideas evolve within a network of actors, Article II explored the historical development of cruise ship concept design. The findings indicate that a few respected visionaries and their teams have played an active role in interorganisational futures-focused concept ideation. While international architects and design agencies have driven concept design, Finnish actors have played key roles in engineering planning, project management and construction based on a deep understanding of futures perspectives. From a collaborative foresight perspective, the ship owner, design company and production yard define the basis for insight creation and adoption. In the concept ideation process, futures-focused actions are embedded

in operational-level and collaboration practices that do not include outsiders or actors in the wider network.

Article III examined sustainability enhancement within a joint project network as an issue that extends into the far future and offers network partners many touchpoints for contributing ideas. Joint projects can be understood as an opportunity space for collaborative foresight (Sverrisson, 2001; Agogué, 2017), and the findings highlighted the importance of social ties for these practices at the operational level. A heterogeneous and sparse network structure supports interaction and provides an equity-based, high-trust space in which to share future-focused ideas (Keller et al., 2019). Article III reported that lead company actors direct future sustainability enhancement at the practice level. Although the project network was organised around academic researchers, company actors did not regard them as focal sources of futures insights. The overall results showed that the joint business-academia project had a weak role in establishing coherent collaborative foresight actions, but the collaboration within the joint project offered possibilities for sharing future-focused ideas with the participating actors.

Article IV extended the research on collaborative foresight practices in joint project contexts by exploring the social construction and sharing of futures images and examining the impact of collectively held futures images on sustainability enhancement. This study identified four futures images: *money rules, the customer is always right, local economy focus* and *the most sustainable ships in the world.* To explore the construction of futures images, the study analysed the content of workshop group discussions in terms of content, range of alternatives, timescale, sociality and resonance, highlighting the role of the social network in resolving sustainability challenges. Section 3.3.1 described the construction of futures images.

5.2 Theoretical implications

Taken together, the main findings of this dissertation confirm the relevance of a relational perspective on collaborative foresight practices. Traditionally, studies of CF practices have focused on procedures and methodology rather than on social relationships, but the social and cultural aspects of foresight processes and practices have attracted increasing interest (Gordon et al., 2020). Constructivist foresight, and particularly the design-oriented approach, highlights emergent and informal practices as an equally important part of strategic foresight as formal trend-based foresight (Tuomi, 2019; Mastio & Dovey, 2021). The CIOF perspective emphasises functions such as joint actions for new designs and collaboration across sectors, but research and evaluation of those functions requires greater conceptual clarity and mutually agreed upon methods rather than multiple conceptualisations of the same phenomenon (see, for example, Kurki, 2020, p. 43–44).

The critical approach to social relationships in collaborative foresight illuminates how different actors influence the acceptance of particular ideas during futures construction. The analytical model in Article IV employs critical social theory (Habermas & Fultner, 2001; Ahlqvist & Uotila, 2020; Mische, 2014) to explicate the role of sociality and resonance in the construction of futures images as a proactive process that shapes futures. This ontological assumption is based on a constructivist approach (Tuomi, 2019) that has been neglected in the CF literature to date, even in critical or capability-oriented discourses on anticipation and futures literacy (Ahlqvist & Rhisiart, 2015; Gordon, 2020; Miller, 2015).

5.3 Methodological implications

The study has two main implications for methodology. First, it highlights the utility of SNA methodology, which is less frequently applied to CF and forward-looking collaboration. Second, it shows how the evolution of futures images can be traced beyond the level of general description. SNA offers a range of methods for studying social structures and ties between actors, and basic measures such as density, betweenness and network shape facilitate a critical examination of network influence and subgroups. In the present study, these methods proved fruitful in identifying focal individuals and subgroups and confirmed the significance of social structure for collaborative foresight. SNA methods are also relatively easy to apply at the practice level – for example, to evaluate foresight network cohesion, to explore how actors share resources and to operationalise foresight culture or networks (Rohrbeck, 2015; Weber, Sailer & Katzy, 2015; van der Duin et al., 2014).

Article IV further develops the analysis of futures images by elaborating their content and tracing how they are discussed in a workshop context. This systematic structured analysis provides a deeper and finer-grained understanding of futures images in terms of alternatives, timescales, social contexts and ideas that drive innovation and change. In highlighting the varied content of different images, the framework is promising as a tool for guiding workshop discussions and collaborative decision-making. Article IV also demonstrates the use of workshops to gather data on futures images by combining documentation methods, including transcripts, observations, facilitator notes and 360-degree video recordings, in an experimental way. These diverse methods helped to capture the dynamics of collaborative discussions and supported the analysis of varied futures images. The multi-faceted data also augmented the validity of the interpretations. In particular, the 360-degree video recordings contributed to the analysis of resonances and reformulations of futures images.

5.4 Practical implications

In a deeply networked industry, where multiple partners collaborate to design ships for decades ahead, foresight activities appear to be central to concept creation. Drawing on transdisciplinary knowledge from engineering design, CF and the history of cruise ship concept development, the present findings have several practical implications. As few engineering design studies have addressed the role of collaboration and partnership in futures-focused actions (Keiramo, 2021), the present research will help practitioners make sense of these issues and their relevance in the initial phase of ship design by highlighting the importance of social ties in collaborative foresight practices and providing tools to explore the social structures underpinning partnership networks. Similarly, the historic perspective will help practitioners develop and optimise the conceptual design process by understanding how that process has developed, how it impacts other design activities, how information can be coordinated and managed and how partnerships develop and influence collaboration.

Understanding foresight culture and futures-focused actions as elements of company operating models can help improve foresight systems and associated managerial practices. The relational perspective developed here promises to enrich knowledge construction and experimentation in areas such as sustainability enhancement. The study reinforces the view that a company's awareness of its network of external collaborators and idea providers and their interconnections can promote rich and diverse multidirectional interaction and insight flow.

The present research also confirms the relevance of sustainability enhancement for futures-focused collaboration. Although less actively addressed at present, the content of futures images and other sustainability-related material is likely to provide inspiration in practical contexts, such as strategy planning. In particular, a futures-focused perspective offers an alternative to historic performance data as a driver of sustainability enhancement.

A historical understanding of collaboration in Finnish networks can broaden managerial and expert options for developing processes such as innovation and communication and can help to link concept ideation to other business processes. By understanding vision building, key innovations and their outcomes in changing contexts, this longitudinal perspective will help managers grasp the significance of social context for collaborative foresight.

The dissertation's main contributions can be summarised as follows:

- Theoretically, this dissertation contributes to the academic CF literature by providing empirical support for critical and social perspectives on actors' positions and roles in the collaborative construction of futures.
- Methodologically, the dissertation contributes to FS methodology by showcasing the use of SNA methodology in a CIOF context.

- At a practical level, this dissertation highlights the means and importance of integrating operational-level interactions in collaborative foresight processes.

5.5 Limitations and directions for future research

The dissertation study has several limitations, some of which also suggest pathways for further research. As the study is set in a specific industry and context, the observed network dynamics may be unique, and the analytical frameworks used here should be tested in other project-based businesses that produce complex products. While the empirical study explicates some aspects of collaborative foresight, this context specificity means that it cannot necessarily be generalised to produce a coherent theoretical model. The mixed methods approach is based on qualitative methods and frameworks that again limit generalisation and remain to be evaluated against different theoretical paradigms. Nevertheless, the study provides grounds for developing working hypotheses in pursuit of a more comprehensive understanding of collaborative foresight.

The present dissertation study focused on social dynamics rather than on the substance of concept ideation and sustainability enhancement, which limits the applicability of these results to the reality of the development process. Neither the content of forward-looking insights nor the actors' ability to produce such insights was critically assessed. While the results clarify sustainability trends and associated futures images to some extent, further substantive empirical research is needed to examine the dynamically changing content of sustainability enhancement.

The limitations of the research design include the joint project context, which provided limited space for collaboration because project seminars, workshops and other encounters were mainly confined to sustainability experts within the partner organisations. As these individuals are probably the most eager and informed advocates of new sustainability solutions, this is likely to have influenced the outcomes of the interviews and workshops.

The pathways for future research fall into three broad categories: more comprehensive validation of collaborative foresight practices and increased quantitative testing of analytical frameworks; the foresight capabilities and social resources required for collaboration at individual, organisational and network levels; and the analysis of affective aspects of forward-looking agency and collaborative foresight in developing shared interpretations of possible futures. This research agenda can guide the design and implementation of futures-focused projects, addressing the tensions between a positivistic approach to foresight and a dynamic nonlinear forward-looking approach. Existing methodological challenges can be overcome by placing greater emphasis on socio-relational structures and insight construction and sharing.

6 Conclusions

The dissertation broadly addresses the question of how the collaborative construction of futures insights can be analysed for practical use by drawing valid conclusions from fuzzy sets of inputs. The forward-looking model of ship concept development adopts a holistic approach to collaborative foresight to support the radical innovation development, decision making and management of socio-technological systems. The study also promotes the idea of a continuum of time perspectives to inform collaborative foresight. While this idea of the *anticipatory present* is not new or unique, the study emphasises the potential of a diverse set of actors as latent resources for collaborative foresight. Operational-level interactions between actors, such as managers, designers and experts, often prompt a short-term perspective, leading to decisions that serve immediate needs rather than accommodating futures insights. I contend that a longer-term perspective is also meaningful at the operational level and that futures-focused thinking is embedded in social relations and connections with interorganisational partners and industrial associations. In this regard, short-term and long-term thinking and acting at the operational level are, to some extent, intertwined and manifested in social and general collaborative actions.

The study contributes to CF theory by linking social and operational systems. At the risk of diminishing the systemic and processual focus of traditional CF, a collaborative foresight perspective proceeds from the assumption that the future shapes and is shaped by social processes. The challenge is to more tightly link social and operational processes to facilitate knowledge construction and flow between these systems. The study explores the possibility of developing novel processes to integrate dynamic and informal relationships in CF systems. More specifically, the study contributes to the current debate around socio-relational perspectives on CF by stressing the importance of linking relational aspects to strategic and human resource touchpoints, as well as by developing substantive operational-level themes like sustainability enhancement.

The theoretical lenses used here to analyse actor connections in forward-looking field areas such as sustainability enhancement invite further elaboration of those connections, which raises critical questions about who determines the value assigned to

particular futures insights or the validity of favoured sources. The critical-transformative approach to CIOF acknowledges the normativity of the context in question and directs analytical attention to structural issues, such as equality in social networks or procedures for exploring futures. As foresight activities in collaborative interorganisational networks are likely to be longer-term or shared projects or programmes with multiple possible outcomes, it is important to ensure transparency in relation to network actors' roles.

In addition to SNA, the dissertation introduced a framework for analysing the social aspects of futures image construction in a workshop context (see Table 1). The findings confirm that SNA is a useful way of visualising the role of social structures in collaborative foresight. However, more attention should be paid to the dynamics of social structures in collaborative forward-looking actions when designing futures processes; in particular, leaders and designers need to develop a more analytical awareness of how social structures affect equality of interaction.

From a practical standpoint, the study broadens and augments approaches to long-term futures based on the engagement of diverse actors and the development of novel channels for exploration. Although the study offers no precise vision for sustainability enhancement within the shipbuilding industry, it identifies tools for sharing ideas and introducing new insights. The potential for growing futures capabilities and emancipatory insight was embedded in the transformative and reflective experience that the research design allowed for the actors engaged with the research project. More generally, these findings will make practitioners in this and other industries more aware of the need for equal and ongoing social relationships for effective forward-looking collaboration.

Abbreviations

CF	Corporate foresight
CIOF	Collaborative interorganisational foresight
FS	Futures studies
NGO	Non-governmental organisation
SME	Small and medium-sized enterprises
SNA	Social network analysis

List of References

Adam, B., & Groves, C. (2007). *Future matters: Action, knowledge, ethics*. Brill.

Agogué, M. (2017). Explicating the role of innovation intermediaries in the "unknown": A contingency approach. *Journal of Strategy and Management, 10*(1), 19–39.

Ahlqvist, T., & Rhisiart, M. (2015). Emerging pathways for critical futures research: Changing contexts and impacts of social theory. *Futures, 71*, 91–104. https://doi.org/10.1016/j.futures.2015.07.012

Ahlqvist, T., & Uotila, T. (2020). Contextualising weak signals: Towards a relational theory of futures knowledge. *Futures, 119*, 102543. https://doi.org/10.1016/j.futures.2020.102543

Ahola, M., & Murto, P. (2018). When people are mission of a ship – Design and user research in the marine industry. In P. Kujala & L. Lu (Eds.), *Marine design XIII. International Marine Design Conference (IMDC 2018)*, June 10–14, 2018, Helsinki, Finland.

Ahvenharju, S., Minkkinen, M., & Lalot, F. (2018). The five dimensions of futures consciousness. *Futures, 104*, 1–13. https://doi.org/10.1016/j.futures.2018.06.010

Ahuja, G., Russell, W. O., & Lee, P. M. (2005). Managerial foresight and attempted rent appropriation: Insider trading on knowledge of imminent breakthroughs. *Strategic Management Journal, 26*, 791–808. https://doi.org/10.1002/smj.474

Argote, L., & Fahrenkopf, E. (2016). Knowledge transfer in organizations: The roles of members, tasks, tools, and networks. *Organizational Behavior and Human Decision Processes*, *136*, 146–159 https://doi.org/10.1016/j.obhdp.2016.08.003

Amara, R. 1981. The futures field: Searching for definitions and boundaries. *The Futurist, 15*(1), 25–29.

Axinn, G. W., & Pearce, D. L. (2006). *Mixed method data collection strategies.* Cambridge University Press.

Baer, M., Evans, K., Oldham, G. R., & Boasso, A. (2015). The social network side of individual innovation: A meta-analysis and path-analytic integration. *Organizational Psychology Review, 5*(3), 191–223. https://doi.org/10.1177/2041386614564105

Barbrook, R. (2007). *Imaginary futures: From thinking machines to the global village* (1st ed.). Pluto Press.

Bell, W. (2004). *Foundations of futures studies: Human science for a new era*. Transaction Publishers.

Björk, J., & Magnusson, M. (2009). Where do good innovation ideas come from? Exploring the influence of network connectivity on innovation idea quality. *Journal of Product Innovation Management, 26*(6), 662–670. https://doi.org/10.1111/j.1540-5885.2009.00691.x

Boda, C. S. (2018). Community as a key word: A heuristic for action-oriented sustainability research. *Sustainability, 10*(8), 2775. https://doi.org/10.3390/su10082775

Borgatti, S. P., Everett, M. G., & Freeman, L. C. (2002). *UCINET for Windows: Software for social network analysis.* Analytic Technologies.

Borgatti, S. P., Mehra, A., Brass, D. J., & Labianca, G. (2009). Network analysis in the social sciences. *Science, 323*(5916), 892. https://doi.org/10.1126/science.1165821

Borgatti, S. P., Everett, M. G., & Johnson, J. C. (2013). *Analyzing social networks*. Sage.

Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health, 11*(4), 589–597. https://doi.org/10.1080/2159676X.2019.1628806

Brown, J. S., & Duguid, P. (2001). Knowledge and organization: A social-practice perspective. *Organization Science*, *12*(2), 198–213. https://doi.org/10.1287/orsc.12.2.198.10116

Burkitt, I. (2016). Relational agency: Relational sociology, agency and interaction. *European Journal of Social Theory, 19*(3), 322–339. https://doi.org/10.1177/1368431015591426

Burt, R. S. (2004). Structural holes and good ideas. *American Journal of Sociology, 110*(2), 349–399. https://doi.org/10.1086/421787

Burt, R. S., Meltzer, D. O., Seid, M., Borgert, A., Chung, J. W., Colletti, R. B., Dellal, G., Kahn, S. A. Kaplan, H. C., Peterson, L. E., & Margolis, P. (2012). What's in a name generator? Choosing the right name generators for social network surveys in healthcare quality and safety research. *BMJ Quality & Safety, 21*(12), 992–1000.

Burton, L., & Slaughter, R. (2006). Futures beyond dystopia: Creating social foresight. Routledge/Palmer. *Futures, 38*(9), 1128–1131. https://doi.org/10.1016/j.futures.2006.03.001

Chan, S. (2017). Enhanced video content analysis for emotion measurement: A potential shift in the heuristical approach towards video-based emotions analytics. Master's thesis, Harvard Extension School. https://dash.harvard.edu/handle/1/33825951

Cheng, T. C. E., Zanjirani Farahani, R., Lai, K., & Sarkis, J. (2015). Sustainability in maritime supply chains: Challenges and opportunities for theory and practice. https://doi.org/10.1016/j.tre.2015.03.007

Cole, S., & Kvavilashvili, L. (2019). Spontaneous future cognition: The past, present and future of an emerging topic. *Psychological Research, 83*(4), 631–650. https://doi.org/10.1007/s00426-019-01193-3

Cuhls, K. (2003). From forecasting to foresight processes – New participative foresight activities in Germany. *Journal of Forecasting, 22*(2–3), 93–111. https://doi.org/10.1002/for.848

Daheim, C., & Uerz, G. (2008). Corporate foresight in Europe: From trend based logics to open foresight. *Technology Analysis & Strategic Management, 20*(3), 321–336. https://doi.org/10.1080/09537320802000047

Dator, J. (2019). *Jim Dator: A noticer in time. Selected work, 1967–2018*. Springer International Publishing.

De Jouvenel, B. (2012). Futuribles: Studies in conjecture. *Political Quarterly, 83*, 347–348. https://doi.org/10.1111/1467-923X.02404_13

Dufva, M. (2015). *Knowledge creation in foresight: A practice- and systems-oriented view*. Aalto University publication series Doctoral dissertations 222/2015 Retrieved from http://urn.fi/URN:ISBN:978-952-60-6608-0

Dufva, M., & Ahlqvist, T. (2015). Elements in the construction of future-orientation: A systems view of foresight. *Futures, 73*, 112–125. https://doi.org/10.1016/j.futures.2015.08.006

Emirbayer, M. (1997). Manifesto for a relational sociology. *American Journal of Sociology, 103*(2), 281–317. https://doi.org/10.1086/231209

Everett, M. G., & Borgatti, S. P. (2020). Unpacking Burt's constraint measure. *Social Networks, 62*, 50–57. https://doi.org/10.1016/j.socnet.2020.02.001.

Fagerberg. J. (2018). Mobilizing innovation for sustainability transitions: A comment on transformative innovation policy. *Research Policy, 47*(9), 1568–1576. https://doi.org/10.1016/j.respol.2018.08.012

Froehlich, D., Rehm, M., & Rienties, B. (2019). Mixed methods social network analysis theories and methodologies in learning and education. Routledge.

Fuhse, J. A. (2015). Theorizing social networks: The relational sociology of and around Harrison White. *International Review of Sociology, 25*(1), 15–44. https://doi.org/10.1080/03906701.2014.997968

Gattringer, R., & Wiener, M. (2020). Key factors in the start-up phase of collaborative foresight. *Technological Forecasting and Social Change, 153*, 119931. https://doi-org.ezproxy.utu.fi/10.1016/j.techfore.2020.119931

Gattringer, R., Wiener, M., & Strehl, F. (2017). The challenge of partner selection in collaborative foresight projects. *Technological Forecasting and Social Change, 120*, 298–310. https://doi.org/10.1016/j.techfore.2017.01.018

Gibson, D. R. (2005). Taking turns and talking ties: networks and conversational interaction. *The American Journal of Sociology, 110*(6), 1561–1597. https://doi.org/10.1016/j.futures.2011.10.005

Gloor, P. A., Paasivaara, M., Schoder, D., & Willems, P. (2008). Finding collaborative innovation networks through correlating performance with social network structure. *International Journal of Production Research, 46*(5), 1357–1371. https://doi.org/10.1080/00207540701224582

Gordon, A. V., Ramic, M., Rohrbeck, R., & Spaniol, M. J. (2020). 50 years of corporate and organizational foresight: Looking back and going forward. *Technological Forecasting & Social Change, 154*, 119966. https://doi.org/10.1016/j.techfore.2020.119966

Gould, R. V., & Fernandez, R. M. (1989). Structures of mediation: A formal approach to brokerage in transaction networks. *Sociological Methodology, 19*, 89–126. https://doi.org/10.2307/270949

Habermas, J., & Fultner, B. (2001). *On the pragmatics of social interaction: Preliminary studies in the theory of communicative action*. Polity.

Haegeman, K., Weber, M. & Könnölä, T. (2012). Preparing for Grand Challenges: The Role of Future-Oriented Technology Analysis in Anticipating and Shaping Structural and Systemic Changes: Editorial. *Technology analysis & strategic management* 24.8 (2012): 729–734.

Hamilton, M., Hileman, J., & Bodin, Ö. (2020). Evaluating heterogeneous brokerage: New conceptual and methodological approaches and their application to multi-level environmental governance networks. *Social Networks, 61*, 1–10. https://doi.org/10.1016/j.socnet.2019.08.002

Havas, A., & Weber, K. M. (2017). The 'fit' between forward-looking activities and the innovation policy governance sub-system: A framework to explore potential impacts. *Technological Forecasting and Social Change, 115*, 327–337. https://doi.org/10.1016/j.techfore.2016.07.016

Heaslip, R. J. (2014). *Managing complex projects and programs: How to improve leadership of complex initiatives using a third-generation approach.* Wiley.

Heger, T., & Boman, M. (2015). Networked foresight – The case of EIT ICT labs. *Technological Forecasting & Social Change, 101*, 147–164. https://doi.org/10.1016/j.techfore.2014.02.002

Hines, A., Gary, J., Daheim, C., & van der Laan, L. (2017). Building foresight capacity: Toward a foresight competency model. *World Futures Review, 9*(3), 123–141. https://doi.org/10.1177/1946756717715637

Hoolohan, C., & Browne, A. L. (2018). Reimagining spaces of innovation for water efficiency and demand management: An exploration of professional practices in the English water sector. *Water Alternatives, 11*(3), 957–978.

Iden, J., Methlie, L. B., & Christensen, G. E. (2017). The nature of strategic foresight research: A systematic literature review. *Technological Forecasting & Social Change, 116*, 87–97. https://doi.org/10.1016/j.techfore.2016.11.002

Wegner, K. (eds.) Grasping human perception of the future: A structured approach to mental models of time and prospect. In Logistik im wandel der zeit – von der produktionssteuerung zu vernetzten supply chains (pp. 767–789). Springer Gabler.

Jasanoff, S., & Kim, S. (2015). *Dreamscapes of modernity: Sociotechnical imaginaries and the fabrication of power*. University of Chicago Press. https://doi.org/10.7208/9780226276663

Jasny, L., & Lubell, M. (2015). Two-mode brokerage in policy networks. *Social Networks, 41*, 36–47. https://doi.org/10.1016/j.socnet.2014.11.005

Jissink, T., Schweitzer, F., & Rohrbeck, R. (2019). Forward-looking search during innovation projects: Under which conditions it impacts innovativeness. *Technovation,* 84–85, 71–85. https://doi.org/10.1016/j.technovation.2018.07.001

Jokinen, L., Palonen, T., Kalliomäki, H., Apostol, O., & Heikkilä, K. (2020). Forward-looking sustainability agency for developing future cruise ships. *Sustainability, 12*(22), 1–20. https://doi.org/10.3390/su12229644

Jokinen, L., Keiramo, M., Kivistö, P., & Palonen, T. (2020). Past, present and futures of cruise ship concept design: From the perspective of the Finnish cruise ship industry. Merenkulun riskit ja resurssit. *Nautica Fennica.* Suomen merihistoriallinen yhdistys ry, Museovirasto [Finnish Heritage Agency]

Jungk, R., & Mullert, N. (1987). *Future workshops: How to create desirable futures*. Institute for Social Inventions.

Kaboli, S. A., & Tapio, P. (2018). How late-modern nomads imagine tomorrow? A causal layered analysis practice to explore the images of the future of young adults. *Futures, 96*, 32–43. https://doi.org/10.1016/j.futures.2017.11.004

Keinonen, T., & Takala, R. (eds.) (2006). *Product concept design: A review of the conceptual design of products in industry*. Springer-Verlag. https://www.springer.com/gp/book/9781846281259

Keiramo, M. (2021). Pathways of the creative journey – The significance of a cruise ship concept design. Aalto University. 1–142.

Keiramo, M., Heikkilä, E., Jokinen, L., & Romanoff, J. (2018). A concept for collaborative and integrative process for cruise ship concept design – from vision to design by using double design spiral. In P. Kujala & L. Lu (Eds.), *Marine Design XIII, 13th International Marine Design Conference*. Taylor & Francis.

Kelliher, & Byrne, D. (2015). Design futures in action: Documenting experiential futures for participatory audiences. *Futures, 70*, 36–47. https://doi.org/10.1016/j.futures.2014.12.004

Keller, J., Wong, S., & Liou, S. (2019). How social networks facilitate collective responses to organizational paradoxes. *Human Relations, 73*(3). https://doi.org/10.1177/0018726719827846

Kivimaa, P., Boon, W., Hyysalo, S., & Klerkx, L. (2019). Towards a typology of intermediaries in sustainability transitions: A systematic review and a research agenda. *Research Policy, 48*(4), 1062–1075. https://doi.org/10.1016/j.respol.2018.10.006

Köhler, J., Geels, F. W., Kern, F., Markard, J., Wieczorek, A., Alkemade, F., & Wells, P. (2019). An agenda for sustainability transitions research: State of the art and future directions. *Environmental Innovation and Societal Transitions, 31*, 1–32.

Könnölä, T., Brummer, V., & Salo, A. (2007). Diversity in foresight: Insights from the fostering of innovation ideas. *Technological Forecasting & Social Change, 74*(5), 608–626. https://doi.org/10.1016/j.techfore.2006.11.003

Kuhmonen, T. (2017). Exposing the attractors of evolving complex adaptive systems by utilising futures images: Milestones of the food sustainability journey. *Technological Forecasting and Social Change, 114*, 214–225. https://doi.org/10.1016/j.techfore.2016.08.015

Kujala, P., Lu, L., & Lu, L. (Eds.) (2018). *Marine Design XIII: Proceedings of the 13th International Marine Design Conference (IMDC 2018)*, June 10–14, 2018, Helsinki, Finland. CRC Press. https://doi.org/10.1201/9781351010047

Kurki, S. (2020). *Foresight and transformation: Observing pioneers in our changing societies*. Annales Universitatis Turkuensis, Ser. E, Tom. 62: Oeconomica, Turku 2020. http://urn.fi/URN:ISBN:978-951-29-8127-4

Lee, C., Chong, H., Liao, P., & Wang, X. (2018). Critical review of social network analysis applications in complex project management. *Journal of Management in Engineering, 34*(2), 04017061. https://doi.org/10.1061/(ASCE)ME.1943-5479.0000579

Lichtman, M. (2017). Interviewing. In *Qualitative research for the social sciences* (pp. 241–278). SAGE Publications.

MacKay, B., Chia, R., & Nair, A. K. (2020). Strategy-in-practices: A process philosophical approach to understanding strategy emergence and organizational outcomes. *Human Relations,* https://doi.org/10.1177/0018726720929397

Malaska, P. (2000). Knowledge and information in futurology. *Foresight, 2*(2), 237–244. https://doi.org/10.1108/14636680010802582

Malaska, & Holstius, K. (1999). Visionary management. Foresight (Cambridge), 1(4), 353–361. https://doi.org/10.1108/14636689910802269

Mannermaa, M. (1991). In search of an evolutionary paradigm for futures research. *Futures, 23*(4), 349–372. https://doi.org/10.1016/0016-3287(91)90111-E

Marsden, P. V. (2002). Egocentric and sociocentric measures of network centrality. *Social Networks, 24*(4), 407–422. https://doi.org/10.1016/S0378-8733(02)00016-3

Mastio, E., & Dovey, K. (2021). Contextual insight as an antecedent to strategic foresight. *Futures, 128*, 102715. https://doi.org/10.1016/j.futures.2021.102715

Meyer, S. B. (2016). Tavory, I. and Timmermans, S. Abductive analysis: Theorizing qualitative research. *British Journal of Sociology, 67*(1), 182–183. https://doi.org/10.1111/1468-4446.12170

Miles, M. B., & Huberman, A. M. (1994). Qualitative data analysis: An expanded sourcebook (2nd ed.). Sage.

Miller, R. (2015). Learning, the future, and complexity. An essay on the emergence of futures literacy. *European Journal of Education, 50*(4), 513–523. https://doi.org/10.1111/ejed.12157

Minkkinen, M. (2019). Making the future by using the future: A study on influencing privacy protection rules through anticipatory storylines. *New Media & Society, 21*(4), 984–1005. https://doi.org/10.1177/1461444818817519

Minkkinen, M. (2020). *A breathless race for breathing space: Critical-analytical futures studies and the contested co-evolution of privacy imaginaries and institutions.* Annales Universitatis Turkuensis, Ser. E, Tom. 55: Oeconomica, Turku 2020. http://urn.fi/URN:ISBN:978-951-29-8042-0

Miranda, J., Pérez-Rodríguez, R., Borja, V., Wright, P. K., & Molina, A. (2019). Sensing, smart and sustainable product development (S3 product) reference framework. *International Journal of Production Research, 57*(14), 4391–4412. https://doi.org/10.1080/00207543.2017.1401237

Mische, A. (2009). Projects and possibilities: Researching futures in action. *Sociological Forum, 24*(3), 694–704. https://doi.org/10.1111/j.1573-7861.2009.01127.x

Mische, A. (2014a). Measuring futures in action: Projective grammars in the Rio+20 debates. *Theory and Society, 43*(3), 437–464. https://doi.org/10.1007/s11186-014-9226-3

Mische, A. (2014b). Relational sociology, culture, and agency. In J. Scott & P. J. Carrington (Eds.), *The SAGE handbook of social network analysis* (pp. 80–98). Sage Publications.

Morgan, D. (2002). Images of the future: A historical perspective. *Futures, 34*(9), 883–893. https://doi.org/10.1016/S0016-3287(02)00007-1

Niemanis, A., Åsberg, C., & Hayes, C. (2015). Post-humanist imaginaries. In K. Bäckstrand & E. Lövbrand (Eds.), *Research handbook on climate governance* (pp. 480–490). Edward Elgar Publishing.

Paliokaitė, A., & Pačėsa, N. (2015). The relationship between organisational foresight and organisational ambidexterity. *Technological Forecasting & Social Change, 101*, 165–181. https://doi.org/10.1016/j.techfore.2014.03.004

Palonen, T., & Froehlich, D. E. (2019). Mixed methods social network analysis to drive organizational development. In D. E. Froehlich, M. Rehm, & B. C. Rienties (Eds.), *Mixed methods social network analysis: Theories and methodologies in learning and education* (pp. 87–100). Routledge.

Patomäki, H. (2020). On the historicity of social ontology. *Journal for the Theory of Social Behaviour, 50*(4), 439–461. https://doi.org/10.1111/jtsb.12254

Payán-Sánchez, B., Belmonte-Ureña, L. J., Plaza-Úbeda, J. A., Vazquez-Brust, D., Yakovleva, N., & Pérez-Valls, M. (2021). Open innovation for sustainability or not: Literature reviews of global research trends. *Sustainability*, *13*(3), 1136. MDPI AG. http://dx.doi.org/10.3390/su13031136

Peter, B., & Id, K. (2017). Innovation and specialisation: The story of shipbuilding in Finland (1st ed.). Lyngby: Nautilus Forlag. https://utu.finna.fi/Record/volter.1939937

Piirainen, K., & Gonzalez, R. (2015). Theory of and within foresight – "What does a theory of foresight even mean?" *Technological Forecasting and Social Change, 96*(C), 191–201. https://doi.org/10.1016/j.techfore.2015.03.003

Plano Clark, V. L., & Creswell, J. W. (2008). *The mixed methods reader.* Sage.

Poli, R. (2015). The implicit future orientation of the capability approach. *Futures, 71*, 105–113. https://doi.org/10.1016/j.futures.2015.03.002

Poli, R. (2017). *Introduction to anticipation studies*. Springer.

Ramaswamy, & Ozcan, K. (2018). What is co-creation? An interactional creation framework and its implications for value creation. *Journal of Business Research, 84*, 196–205. https://doi.org/10.1016/j.jbusres.2017.11.027

Rohrbeck, R. (2011). *Corporate foresight. Towards a maturity model for the future orientation of a firm*. Springer.

Rohrbeck, R., & Schwarz, J. O. (2013). The value contribution of strategic foresight: Insights from an empirical study of large European companies. *Technological Forecasting and Social Change, 80*(8), 1593–1606. https://doi.org/10.1016/j.techfore.2013.01.004

Rohrbeck, R., Konnertz, L., & Knap, S. (2013). Collaborative business modelling for systemic and sustainability innovations. *International Journal of Technology Management, 63*, 1–2.

Rohrbeck, R., Battistella, C., & Huizingh, E. (2015). Corporate foresight: An emerging field with a rich tradition. *Technological Forecasting & Social Change, 101*, 1–9. https://doi.org/10.1016/j.techfore.2015.11.002

Rohrbeck, R., & Kum, M. E. (2018). Corporate foresight and its impact on firm performance: A longitudinal analysis. *Technological Forecasting & Social Change, 129*, 105–116. https://doi.org/10.1016/j.techfore.2017.12.013

Rossel, P. (2012). Early detection, warnings, weak signals and seeds of change: A turbulent domain of futures studies. *Futures, 44*(3), 229–239. https://doi.org/10.1016/j.futures.2011.10.005

Rowland, N. J., & Spaniol, M. J. (2020). On inquiry in futures and foresight science. *Futures & Foresight Science,* e37. https://doi.org/10.1002/ffo2.37

Rupo, D., Perano, M., Centorrino, G., & Vargas-Sanchez, A. (2018). A framework based on sustainability, open innovation, and value cocreation paradigms – A case in an Italian maritime cluster. *Sustainability, 10*(3), 729. https://doi.org/10.3390/su10030729

Saarni, J., Heikkilä, K., Kalliomäki, H., Mäkelä, M., Jokinen, L., & Apostol, O. (2019). Sustainability in shipbuilding – observations from project-oriented supply network in cruise ship construction. University of Turku. Turku School of Economics, 2019.

Sarpong, D., & Meissner, D. (2018). Special issue on 'Corporate foresight and innovation management'. *Technology Analysis & Strategic Management, 30*(6), 625–632. https://doi.org/10.1080/09537325.2018.1463934

Schatzmann, J., Schäfer, R., & Eichelbaum, F. (2013). Foresight 2.0 – Definition, overview & evaluation. *European Journal of Futures Research, 1*(1), 1–15. https://doi.org/10.1007/s40309-013-0015-4

Scott, J., & Carrington, P. J. (2011). *The SAGE handbook of social network analysis*. Sage.

Seginer, R. (ed.) (2009a). Future orientation: A conceptual framework. In *Future orientation*. *Developmental and ecological perspectives* (pp. 1–27). Springer. https://doi.org/10.1007/b106810

Seginer, R. (ed.) (2009b). Future orientation outcomes. In *Future orientation: Developmental and ecological perspectives* (pp. 165–189). Springer. https://doi.org/10.1007/b106810

Shi, Y., Lin, W., Chen, P., & Su, C. (2019). How can the ISO 9000 QMS improve the organizational innovation of supply chains? *International Journal of Innovation Science, 11*(2), 278–298. https://doi.org/10.1108/IJIS-02-2018-0009

Slaughter, R. A. (1990). The foresight principle. *Futures, 22*(8), 801–819. https://doi.org/10.1016/0016-3287(90)90017-C

Slaughter. (2002). Futures studies as a civilizational catalyst. *Futures, 34*(3), 349–363. https://doi.org/10.1016/S0016-3287(01)00049-0

Schwarz, J. O., Rohrbeck, R., & Wach, B. (2020) Corporate foresight as a microfoundation of dynamic capabilities. *Futures Foresight Science*, *2020*; e28. https://doi.org/10.1002/ffo2.28

Sverrisson, Á. (2001). Translation networks, knowledge brokers and novelty construction: Pragmatic environmentalism in Sweden. *Acta Sociologica, 44*(4), 313. https://doi.org/10.1177/000169930104400403

Tapinos, E., & Pyper, N. (2018). Forward looking analysis: Investigating how individuals 'do' foresight and make sense of the future. *Technological Forecasting and Social Change, 126*, 292–302. https://doi.org/10.1016/j.techfore.2017.04.025

Tavory, I. (2018). Between situations: Anticipation, rhythms, and the theory of interaction. *Sociological Theory, 36*(2), 117–133. https://doi.org/10.1177/0735275118777007

Tavory, I., & Eliasoph, N. (2013). Coordinating futures: Toward a theory of anticipation. *American Journal of Sociology, 118*(4), 908–942. https://doi.org/ 10.1086/668646

Teräs, K. (2017). From war reparations to luxury cruise liners: Production changes and labour relations at the Turku shipyard (Finland) between 1950 and 2010. In R. Varela, H. Murphy, & M. van der Linden (Eds.), *Shipbuilding and ship repair workers around the world* (pp. 193–220). Amsterdam University Press. Retrieved from https://www.jstor.org/stable/j.ctt1n7qk5k.8

Tsoukas, H., & Shepherd, J. (2004). Coping with the future: Developing organizational foresightfulness. *Futures, 36*, (2), 137–144. https://doi.org/10.1016/S0016-3287(03)00146-0

Tuomi, I. (2019). Chronotopes of foresight: Models of time-space in probabilistic, possibilistic and constructivist futures. *Futures & Foresight Science, 1*(2), e11-n/a. https://doi.org/10.1002/ffo2.11

Uzzi, B., & Spiro, J. (2005). Collaboration and creativity: The small world problem. *American Journal of Sociology, 111*(2), 447–504. https://doi.org/10.1086/432782

Vähäkari, N., Lauttamäki, V., Tapio, P., Ahvenainen, M., Assmuth, T., Lyytimäki, J., & Vehmas, J. (2020). The future in sustainability transitions – Interlinkages between the multi-level perspective and futures studies. https://doi.org/10.1016/j.futures.2020.102597

van der, Duin, P. A., & Masini, E. (Eds). (2007). *Knowing tomorrow? How science deals with the future*. Eburon Academic Publishers.

van der Duin, P., Heger, T., & Schlesinger, M. D. (2014). Toward networked foresight? Exploring the use of futures research in innovation networks. *Futures, 59*, 62–78. https://doi.org/10.1016/j.futures.2014.01.008

Varela, R., Murphy, H., & Van der Linden, M. (2017). *Shipbuilding and ship repair workers around the world: Case studies 1950–2010*. Amsterdam University Press.

von der Gracht, H. A., Vennemann, C. R., & Darkow, I. (2010). Corporate foresight and innovation management: A portfolio-approach in evaluating organizational development. *Futures, 42*(4), 380–393. https://doi.org/10.1016/j.futures.2009.11.023

Wasserman, S., & Faust, K. (1994). *Social network analysis: Methods and applications*. Cambridge University Press.

Weber, C., Sailer, K., & Katzy, B. (2015). Real-time foresight – Preparedness for dynamic networks. *Technological Forecasting & Social Change, 101*, 299–313. https://doi.org/10.1016/j.techfore.2015.05.016

Weigand, K., Flanagan, T., Dye, K., & Jones, P. (2014). Collaborative foresight: Complementing long-horizon strategic planning. *Technological Forecasting & Social Change, 85*, 134–152. https://doi.org/10.1016/j.techfore.2013.08.016

Voros, J. (2007). On the philosophical foundations of futures research. In P. A. van der Duin, & E. Masini (Eds.), *Knowing tomorrow? How science deals with the future*. Eburon Academic Publishers.

Xue, X., Zhang, R., Yang, R., & Dai, J. (2014). Innovation in construction: A critical review and future research. *International Journal of Innovation Science, 6*(2), 111–125. https://doi.org/10.1260/1757-2223.6.2.111

Yousefi Nooraie, R., Sale, J. E. M., Marin, A., & Ross, L. E. (2020). Social network analysis: An example of fusion between quantitative and qualitative methods. *Journal of Mixed Methods Research, 14*(1), 110–124. https://doi.org/10.1177/1558689818804060

Zheng, Y., & Yang, H. (2015). Does familiarity foster innovation? The impact of alliance partner repeatedness on breakthrough innovations. *Journal of Management Studies, 52*(2), 213–230. doi:10.1111/joms.1

Appendices

Appendix 1. Article II semi-structured interview process, sample and interviews

Data collection process:

- The interviews aimed to obtain information on the development of accumulating knowledge and expertise in the field of modern cruise ship building design in Finland.
- The data gathering began by selecting four pioneers in the field, eight persons who are currently working in the field, and then four people who were representatives of sub-contractors to cover the full scope.
- The interviews lasted from 41 to 139 minutes each.
- Total of 16 interviewees

The interview themes:

- The term *concept design* and its background.
- The development of concept design processes.
- Significant turning points in cruise ship concept design.
- Recognising the most influential planners in the field and visions of the concept design futures.
- Notions relevant to the future development of concept design and the domain as a whole.

Data and analysis:

- Seventy-nine persons, of which two were female, were nominated as pivotal actors in the concept design.
- The interviews were transcribed.
- The interviews were analysed qualitatively using NVivo 12 software.
- The transcripts were organised into categories.

- The content analysis was conducted inductively. First, relatively broad coding keywords were used by defining the codes for the aspects relevant to concept design processes and the key actors involved.
- The data were analysed several times to identify important notions and organise them according to the question order during the interviews.
- The findings were reorganised based on selected keywords.
- The following thematic categories formed the basis of the keywords:

    1) concept design definitions
    2) key actors and stakeholder groups
    3) development and turning points in concepts
    4) forward-looking actions
    5) collaboration descriptions
    6) named vessels

- Researchers worked independently during the first phase and discussed the results jointly later.
- Quotations were selected during the researchers' meetings to describe the findings in the respondents' own words.

Appendix 2. Articles III and IV semi-structured interview process, sample and data analysis

Data collection process:

- Semi-structured interviews explored sustainability-related practices and the interviewees' perceptions of these within their company.
- Altogether, there were 29 interviewees in the first round and 41 in the second.
- The 41 respondents in the second round differed from those in the first round.
- The interview discussion was loosely structured to cover the three major areas of sustainability: economic, social and environmental.
- The interviewees were prompted to discuss current and past practices, as well as future implications of sustainability for their employer.
- One researcher conducted all of the interviews mainly at the sites of partner companies.
- Field notes from the project meetings and seminars supported interpretations and added to the context understanding.

Data and analysis:

- The researchers coded the empirical material independently.
- The researchers performed multiple rounds of reading and interpretation.
- The data were analysed in an interpretative fashion.
- Thematic coding was performed according to the aspects relevant to each research question.
- Quotations were selected to highlight the findings using the respondents' own words.

Articles III and IV project meetings

Date	Type
Stage 1	
20.6.2016	Research seminar & steering group meeting
5.10.2016	Research seminar & steering group meeting
15.2.2016	Research seminar & steering group meeting
Stage 2	
29.5.2017	Research seminar & steering group meeting
26.9.2017	Research seminar & steering group meeting
30.1.2018	Research seminar & steering group meeting
19.4.2018	Research seminar & steering group meeting
18.9.2018	Research seminar & steering group meeting
28.11.2018	Steering group meeting
29.1.2019	Steering group meeting

Appendix 3 Questionnaire for the SNA analysis in the article III

The aim of this questionnaire is to gather information about social networks within the SUSTIS consortium. This social network analysis will complement the futures workshops and foresight systems analysis to form an overall picture of futures-oriented collaborative sustainability within the consortium partners' networks.

The respondents are the same persons who were interviewed earlier in the SUSTIS project, along with some persons involved with the project, including university and VTT partners.

We need to use names when collecting social network data, but these will be deleted before the reporting phase. Neither companies nor respondents will be identified in reports or scientific articles. Data will only be used for research purposes in accordance with the SUSTIS2 research agreement.

Thank you very much for your cooperation!

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Organisation Name
Respondent's Name

Who would you ask for advice on issues linked to sustainability?
Please tick all the persons you would ask.

With whom do you cooperate on sustainability or other work-related issues?
Please tick all the persons you would cooperate with.

Who do you consider your especially trusted partners?
Please tick all the persons.

From whom (outside of the earlier list of names) do you get insights into sustainability and its implications? Please write the name of the person and/or their organisation.

Who do you consider forerunners within sustainability in all fields or businesses? Please write the name of the person and/or the organisation. Explain your choice with some words, please.

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