A Conceptual Framework for Long-Term Strategic Foresight

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MASTER'S THESIS

A Conceptual Framework for Long-Term Strategic Foresight

In the Context of an Organization within the Defense and Civil Security Industry

In the writing of this thesis, the authors have contributed equally and been included in every part.

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Abstract

As global connectivity becomes the driver of value and vulnerability, new concerns are coming into the foreground that needs to be addressed – for example, the resource security-climate nexus, or the means of governing emerging technologies. The broader context and outset for this thesis is the defense and civil security landscape. More specifically, strategic foresight and the increasing challenge of anticipating and predicting the long-term (+20-40 years) future in terms of uncertainty and complexity is investigated in the context of Saab AB; a global producer of products, services and solutions within the defense and civil security industry. Technology-intensive organizations such as Saab, with long product life cycles and contract cycles, need to explore and address growing threats, as well as to identify new horizons, using holistic and interdisciplinary approaches to succeed in uncertain environments.

In order to obtain the objective for this thesis, a qualitative research approach has been adopted. The research strategy consists of three main parts; a literary review, contextual interviews with the case organization and its surroundings as well as a Delphi study with foresight experts. This has resulted in a conceptual framework for long-term strategic foresight activities in a technology-intensive organization. The framework is divided into six different phases starting from framing and initial gathering of information and resulting in scenario-derived outputs that serve as input to the organizational strategy development.

Keywords: Strategic foresight, Corporate foresight, Long-term foresight, Scenario-planning, Foresight framework, Foresight methodology.

Sammanfattning

Eftersom den sammanlänkade världen blir en allt större drivkraft för värde och sårbarhet, hamnar fokus på nya problem som behöver angripas – såsom länken mellan resurssäkerhet och klimat eller vikten av att övervaka möjliga effekter av framväxande teknologier. Utgångspunkten och kontexten för det här examensarbetet är branschen för försvar och civil säkerhet. Mer specifikt undersöks långsiktig (+20–40 år) strategisk omvärldsanalys och den ökande utmaningen att förutse framtiden i en alltmer osäker och komplex omgivning i kontexten av Saab AB; en global producent av produkter, tjänster och lösningar inom denna bransch. Saab och andra teknologi-intensiva organisationer med långa produktlivscykler och kontraktscykler behöver utforska och angripa framväxande hot samt identifiera nya horisonter och interdisciplinära tillvägagångssätt för att lyckas i osäkra miljöer.

I syfte att uppfylla examensarbetets mål har en kvalitativ forskningsform antagits. Forskningsstrategin består i huvudsak av tre delar; en litteraturstudie, kontextuella intervjuer med case-organisationen och dess omgivning, samt en Delphi-studie med deltagande experter inom framsyn. Detta resulterade i ett konceptuellt ramverk ämnat för långsiktig företagsstrategisk omvärldsanalys i en teknologi-intensiv organisation. Ramverket är indelat i sex olika faser som löper från inramning och initial datainsamling till scenariodrivna insikter som sedan agerar input till organisationens strategiska utveckling.

Nyckelord: Strategisk omvärldsanalys, Företagsstrategisk omvärldsanalys, Långsiktig omvärldsanalys, Scenario planering, Ramverk för omvärldsanalys, Omvärldsanalysmetodologi.

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Lund, May 2020

Katarina Bergman & Charlotte Dahlgren

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List of Acronyms and Abbreviations

Term	*Definition*
BA	Business Area
BP	Business Plan
CoP	Communities of Practice
DCDC	The Development, Concepts and Doctrine Centre at UK MoD
DCS	Defense and civil security
DP	Decision Point
FOI	Swedish Defense Research Agency
GO-Science	UK Government office for Science
ICT	Information and Communication Technology
MoD	Ministry of Defense
PLC	Product Life Cycle
SAF	Swedish Armed Forces
STA	The Swedish Transport Administration
UNDP	United Nations Development Program

1 Introduction

This chapter introduces the reader to extant research, background, and problem formulation of the thesis as well as its objective and research questions. The chapter also sets out the delimitations and the structure of the thesis.

There is continuing and growing interest in strategic foresight (e.g. Andersen & Rasmussen, 2012; Rohrbeck, Battistella & Huizingh, 2015). More specifically, there is interest in how activities can be composed methodologically to suit an organization with a need for long-term foresight, as existing methodological compositions cannot simply be reused for other areas of application (Andersen & Rasmussen, 2012; Durst, Durst, Kolonko, Neef & Greif, 2015; Magruk, 2011; Magruk, 2015). It has also been concluded that there are several aspects that affect the choice of macro-factors in scanning activities, such as industry and time horizon (Becker, 2002; Gasinska & Eriksson 2018; Jonsson & Sonnsjö, 2010), which further complicates such a reuse. Moreover, extant research in the area of strategic foresight has shown that the terminology is ambiguous and that guidelines for the combination of methods are contradictory (Hines & Bishop, 2006; Jørgensen, Miles, Keenan, Clar, Svanfeldt, 2002; Magruk, 2015; Popper, 2008; Rohrbeck et al., 2015; Vecchiato & Roveda, 2010). Similarly, there has been little previous research regarding strategic foresight in the long-term (+20-40 years) perspective as most foresight projects considers a time horizon of +10-20 years (Becker, 2002; Gasinska & Eriksson, 2018; Popper, 2008). Also, the selection of foresight methods is argued to be complex and has not received much prior attention (Becker, 2002; Bishop & Hines, 2012; Magruk, 2015; Raban & Hauptmann, 2016).

Furthermore, there is little extant research on strategic foresight in the context of a corporation, defined as corporate foresight (Daheim & Uerz, 2008). The reason for this is that the outputs and methods adopted are restricted by confidentiality as they are used as a basis for achieving a competitive advantage (ibid). One exception is Shell, a global group of energy and

petrochemical companies, which in contrast to the more secretive and one-off practices of other firms, widely shares and disseminates its scenarios (Wilkinson & Kupers, 2014). It should, however, be noted that Shell makes a clear distinction between public dissemination of scenarios and more discreet sharing of scenario-derived insights (ibid). In addition, it has also been argued that firms often lack formal processes and procedures for strategic foresight activities (Becker, 2002). Instead, such processes often rely on human intuition and experience (Magruk, 2015; Raban & Hauptmann, 2016).

Furthermore, Rohrbeck et al. (2015) argue that corporate foresight enables an organization to lay the foundation for future competitive advantage, since it facilitates the identification, observation, and interpretation of factors that induce change, determine possible organization-specific implications, and triggers appropriate organizational responses. In particular, for technology-intensive companies with long product life cycles (PLC) and high investment costs, it is paramount to be able to identify early changes of technology and market shifts in order to realign product development, new competencies and human resources as well as to restructure the corresponding production system (Becker, 2002). Various authors have further claimed that foresight act as a facilitator in an increasingly volatile environment (Bereznoy, 2017; Gattringer & Wiener, 2020; Rohrbeck et al., 2015). Therefore, particularly in a time of environmental uncertainty and competitive rivalry, the ability to proactively develop future competitive advantages is becoming increasingly important (Rohrbeck et al., 2015).

The aim of this thesis is to establish a conceptual framework for strategic foresight activities within a technology-intensive organization that requires long-term (+20-40 years) strategic foresight. Moreover, this thesis contributes to a structured approach towards a foresight process, which literature has emphasized the value of (Horton 1999; Martin, 1995; Rollwagen, Hofmann & Schneider, 2008; Voros, 2003). In contrast to the traditional approach of relying on human intuition and experience (Magruk, 2015; Raban & Hauptmann, 2016), the approach suggested in this thesis is based on theoretical grounds. The ambiguity in the area of strategic foresight has further been addressed by adopting a holistic approach through the triangulation of previous theory and empirical studies in the form of a Delphi study as well as interviews with a case organization and its surrounding actors. In addition, this thesis seeks to incorporate aspects of implementation that are important for the layout of the framework, and that emerged during

the creation of the framework. This is done to address the complexity of combining methods and advance the understanding of how methods should be selected. The findings further contribute to the existing corporate foresight literature by presenting a conceptual framework developed for a corporate organization, where aspects of confidentiality often restrict.

1.1 Background

1.1.1 **The need for foresight activities in the defense and civil security industry**

The broader context and outset for this thesis is the defense and civil security (DCS) landscape. More specifically, strategic foresight and the increasing challenge of anticipating and predicting the long-term future in terms of uncertainty and complexity (e.g., Köhler et al., 2015) is investigated in the context of Saab AB; a global producer of products, services, and solutions within the DCS industry (Saab AB, 2020).

As global connectivity becomes the driver of value and vulnerability, new concerns are coming into the foreground that needs to be addressed – for example, the resource security-climate nexus, or the means of governing emerging technologies (Wilkinson & Kupers, 2014). Technology-intensive organizations such as Saab, with long PLCs and contract cycles, need to explore and address such growing threats, as well as to identify new horizons, using holistic and interdisciplinary approaches (Becker, 2002). Such experimental, multidisciplinary, and adaptive approaches require construction of innovative foresight structures and models (ibid), which is what this thesis aims to realize. It is further paramount to ensure transparency, intelligibility, and verifiability of both the strategic foresight activities and the results (Durst et al., 2015), as critical security restrictions characterize the DCS industry.

Today, Saab's business plan (BP), which to a large extent is constructed bottom-up on business area (BA) level, covers budgeted plans for the following five years. Additional foresight activities for +10-20-years are conducted in order to better align the 0-5-year plan with a more long-term strategy. This process is mainly top-down driven from the corporate level and aims to create a common ground for the entire Saab Group by including

perspectives regarding business, market and competitor developments, external collaborations as well as future operational and technical capabilities.

1.1.2 **Defining long-term in the area of foresight**

There is dissension regarding what is considered as *long-term* within strategic foresight (Dorr, 2016; Vecchiato & Roveda, 2010). The authors will, therefore, in this section clarify the definition used in this thesis.

Dorr (2016) notes that the term is used without consistency and fewer than ten percent of articles studying the subject explicitly specify their used timeframe. According to Becker (2002), Andersen and Rasmussen (2012) as well as Vecchiato and Roveda (2010), the choice of time horizon depends on the target area or business as well as the objectives with the foresight activities. Foresight within areas that are difficult to change or with long payback periods of investments, e.g. infrastructure and energy supply, require a different and longer time span than areas that can change rapidly, such as information and communication technology (ICT) (Andersen & Rasmussen, 2012; Becker, 2002; Vecchiato & Roveda, 2010). Becker (2002) have identified time horizons ranging from 2-5 years up to a period of 20-30 years, with most firms using horizons between 5 to 15 years. Similar to the case organization in this thesis, companies operating in a field with long PLCs or technology life cycles, or companies with an interest in long-term demographic changes (such as firms in the insurance and banking sector), use a time horizon of up to 30 years (Becker, 2002).

For the purpose of this thesis, the definitions of different time horizons suggested by Andersen and Rasmussen (2012) are adopted; short-term (1-5 years), medium-term (3-15 years), long-term (more than 20 years) and very long-term (more than 50 or 100 years).

1.2 Purpose

The basis for this thesis is to investigate how a process of strategic foresight analysis in a +20-40-year timeframe can be carried out within the DCS industry. The aim is to help navigate by identifying conditions that confirm or fall out of the organization's current foresight analysis over a shorter

timeframe as well as its business-as-usual activities. Moreover, the focus is to examine what elements should be included in such an analysis and what methods should be used.

1.2.1 **Research questions**

The focal issue studied in this thesis has been divided into two research question, where the former is an essential subset of the latter.

RQ1: How should relevant macro-factors be identified and selected for foresight activities in the time horizon of +20-40 years within the defense and civil security industry?

RQ2: How should components and method(s) for foresight activities in the time horizon of +20-40 years be selected and combined within the defense and civil security industry?

1.3 Delimitations

The investigated time horizon in this thesis is limited to long-term foresight analysis, i.e. covering +20-40 years, and the areas of application in focus are companies in the DCS industry. By applying a research strategy including a case study, the result of the thesis is influenced by the case organization. Some of the results are also left out in the publication of the thesis due to confidentiality constraints of the case organization. Moreover, the thesis focuses on how strategic foresight analysis should be carried out in terms of component parts and methods. Although aspects preparing for the implementation into the case organization have been considered, the actual implementation process has not been examined.

1.4 Structure of Thesis

1| *Introduction* This chapter introduces the reader to extant research, background and problem formulation of the thesis as well as its objective and research questions. The chapter also sets out the delimitations and the structure of the thesis.

2| *Methodology* This chapter presents the research strategy of the study. The chapter also presents the corresponding research approach as well as the data collection process and analysis including the development of the final conceptual framework. Finally, the ethical and quality aspects of the research are discussed.

3| *Theoretical background* This chapter presents the theoretical background in the area of foresight. Possible options for choosing macro-factors, extant research on foresight methods, and the relationship between foresight activities and time horizons are presented. Finally, the organizational aspects of foresight activities are discussed.

4| *Analysis* This chapter presents the analysis of the empirical results from the contextual interviews and the Delphi study, presented through five main themes: the DCS industry landscape, organizational considerations, processual aspects, resources and, macro-factors.

5| *The Conceptual Framework* This chapter presents the final conceptual framework developed on the basis of the data analysis. The five phases of the prototype framework, which emerged from the Delphi study, were elaborated on by adding further theoretical and practical insights. This resulted in a framework of six phases, namely: Framing, Scanning, Understanding of linkages, Projections, Implications, and Communication. Each phase, their corresponding methods, and suggested execution process will be elaborated in this chapter.

6| *Discussion* This chapter provides a summary and interpretation of the most significant findings of this thesis as well as their implications. Limitations of the study and suggestions for further research are also provided. Lastly, the chapter presents a conclusion of the thesis.

2 Methodology

This chapter presents the research strategy of the study. The chapter also presents the corresponding research approach as well as the data collection process and analysis including the development of the final conceptual framework. Finally, the ethical and quality aspects of the research are discussed.

2.1 Research Strategy

A research strategy is defined by a plan outlining actions or steps necessary to achieve the objective of the research in a structured manner (Denscombe, 2017). Figure 2.1 illustrates the outline of the research strategy process used to obtain the objective of this thesis. The process consists of three main parts; a literary review i.e. theoretical background, a Delphi study with foresight experts and, contextual interviews.

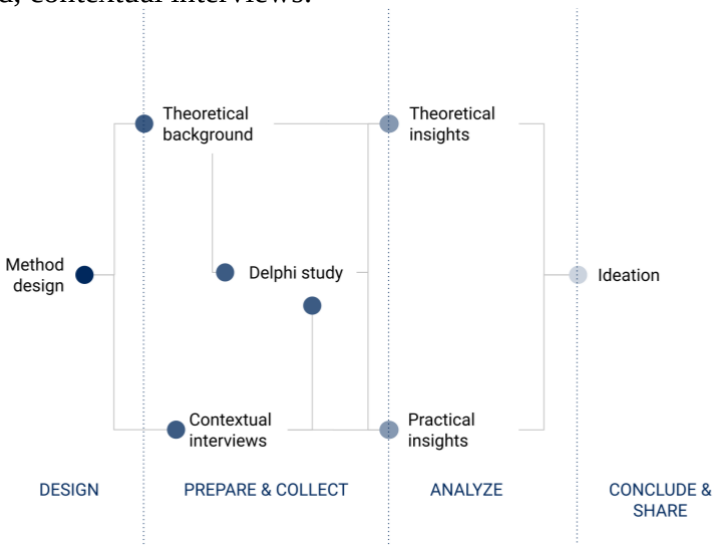

Figure 2.1. The Research Strategy Process of this thesis (adopted from Yin, 2009).

The current strategic foresight processes used by the case organization Saab, other actors in the area of defense as well as organizations within industries with similar characteristics as the DCS industry, have been understood through contextual interviews, as shown in the bottom part of Figure 2.1.

The literature review was an iterative process partly conducted before the Delphi study in order to help the authors of this thesis obtain enough knowledge within the foresight area. Identified aspects in the contextual interviews, performed before the construction of the Delphi study, were also incorporated into the first round of questions. A Delphi study seeks to reach a shared agreement through an iterative and anonymized process consisting of two or more rounds of surveys sent out to independent experts in order to compile their opinions and expertise (Denscombe, 2017). This compilation should be as close as possible to a consensus, commonly defined as a strong agreement where 75 percent of the respondents coincide on a specific issue (Diamond et al., 2014). The Delphi study was identified as suitable to complement the theoretical foundation of this thesis, as it is an effective tool when dealing with cases where there is a lack of a consensus (Linstone & Turoff, 1975; Okoli & Pawlowski, 2003), as in the case of foresight (Magruk, 2015).

The theoretical background and elements from the Delphi study constitute the theoretical insights. Similarly, the contextual interviews, as well as elements from the Delphi study, constitute the practical insights. Together, the theoretical and practical insights were used in the ideation of the final conceptual framework.

2.1.1 **Applied research methods**

The purpose of the first research question is to understand how macro-factors, i.e. subcomponents of the external environment, affecting the long-term strategic direction of companies within the DCS industry, should be identified and selected. In contrast, the purpose of the second research question is to identify which key components and methods that should be used to carry out the analysis of the identified macro-factors within this industry. By the creation of a conceptual framework, it was shown how these component parts fit together. Thus, the research was taken one step further which is in line with Miles and Huberman's (1994) definition of an explanatory study.

Regarding the type of study, Höst, Regnell and Runesson (2006) present four main methodologies: action research, experiments, surveys, or case studies. Yin further (2009) states three conditions to consider when choosing between different methodologies, seen in Figure 2.2. The darkened conditions are those which characterize the nature of this thesis, corresponding to what Yin (2009) suggests should apply to conduct a case study.

Strategy	Form of research question	Requires control of behavioral events?	Focuses on contemporary events?
Experiment	How, why?	Yes	Yes
Survey	Who, what, where, how many, how much?	No	Yes
Archival analysis	Who, what, where, how many, how much?	No	Yes/No
History	How, why?	No	No
Case study	How, why?	No	Yes

Figure 2.2. Relevant situations for different research methods (adopted from Yin, 2009).

Johannesson and Perjons (2014) further state that a case study should address one single instance. They also argue that the instance should be studied in a holistic way, incorporating all relationships and processes both within the instance and its surrounding environment. In this thesis, such an instance is represented by the strategic foresight activities of the company Saab. The internal and external relationships to this instance are investigated through contextual interviews. The addressed instance in a case study can further be studied either in a multiple- or single-case study (Yin, 2009). For this study, a single-case design was used, since Saab exemplifies what Yin (2009) refers to as a representative case, i.e. a case that can represent, or be typical, for a situation. Johannesson and Perjons (2014) further note that a case-study research strategy is characterized using multiple information sources in order to obtain multi-faceted knowledge about the instance.

It should be noted that while the applied research strategy predominantly is based on a case study, a multi-method approach is applied by also including components of a survey through the Delphi study. Delphi studies are mainly

used as a forecasting method, but there are several other areas of application (Linstone & Turoff, 1975). Among these areas, Linstone and Turoff (1975) present the composition of the structure of a model, which corresponds to the purpose of this thesis.

2.1.2 **Research approach**

Denscombe (2017) defines the research approach as either quantitative or qualitative. While qualitative research explores an issue within its context through several perspectives, quantitative research allows the study of isolated numbers most often within larger research projects (ibid). Miles and Huberman (1994) acknowledge that qualitative data is beneficial when searching for new integrations beyond initial conceptions and generating or altering conceptual frameworks. For the objective of this thesis, a predominantly qualitative research approach was chosen with influxes of quantitative analysis in the Delphi study, which according to Popper (2011) often is semi-quantitative. Such a combination of qualitative and quantitative data is also suggested as appropriate when studying complex problems (Höst et al., 2006).

A research approach can further be described by a deductive, inductive, or abductive character (Dubois & Gadde, 2002). While the first approach entails the development of a hypothesis deduced from existing literature to be tested empirically, the second one is based on facts derived from observations (ibid). The third approach applies established theory to empirical observations which existing theory cannot account for; based on those results, new theory is articulated (Alvesson & Kärreman, 2007). Moreover, Dubois and Gadde (2002) argue that this is a method particularly useful when developing new theories and concepts, hence the abductive approach was chosen for this thesis. Based on such an abductive approach, Dubois and Gadde (2002) present a process called *systematic combining.* This process combines a theoretical framework, empirical fieldwork, theory, and case analysis and lets them evolve in tandem, as shown in Figure 2.3.

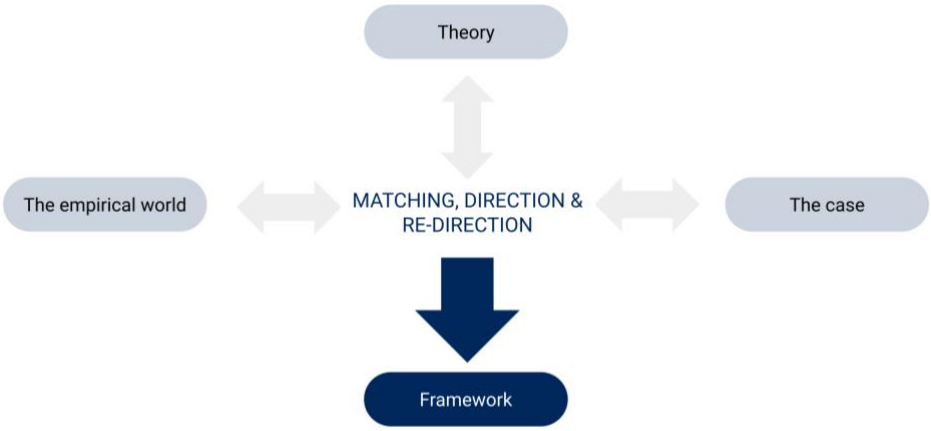

Figure 2.3. The components of systematic combining (adopted from Dubois and Gadde, 2002)

The research methodology can further take the form of a fixed or flexible approach. A fixed methodology is essentially determined in advance, whilst a flexible methodology is adjusted continuously and according to changing conditions (Höst et al., 2006). The character of this thesis is flexible, since empirical observations from interviews may inspire and influence the view of theory and vice versa (Dubois & Gadde, 2002). In addition, although the questionnaires used in the Delphi study are fixed, repetitive rounds enable flexibility and adaptation. By using several methodologies in the research strategy as well as multiple types of data a more holistic view is generated, referred to as *triangulation* (e.g., Robson, 2002; Yin, 2009).

2.2 Data Collection

The data collection was conducted based on both internal and external data. The internal data collection consisted of interviews conducted with individuals within the case company. The literature review, interviews within the area of defense and interviews with similar industries, as well as the Delphi study constituted the external collection of data. As a result, three out of the four main methods of data collection described by Denscombe (2017), i.e. questionnaires, interviews, and documents (e.g. white papers, articles and internal documents from the case organization), are used in this thesis.

2.2.1 **Theoretical background**

Dubois and Gadde (2002) note that only some background should be obtained before entering research situations, while the residual need for theory should then be created during the process. It has been acknowledged that knowing too much detail about the literature puts blinders on and leads to confirmation bias (Gioia, Corley & Hamilton, 2012), why a semi-ignorance of limiting the literature search, conducted before the Delphi study and contextual interviews, has been made as a conscious choice. The theoretical background was later complemented in order to actively support and bridge theoretical gaps that emerged from the contextual interviews and the Delphi study.

The theoretical background was conducted using the following methods:

- *Brief search,* i.e. retrieving a few documents to gain an initial broad understanding of a subject for further research, as explained by Rowley and Slack (2004).
- *Citation pearl growing,* i.e. identifying suitable terms for generating a comprehensive list to be able to conduct a systematic review;
- *Backward chaining,* i.e. tracing references in articles of interest, following the chain of references backward;
- *Forward chaining,* i.e. the opposite of backward chaining, identifying and following articles citing the current source;
- *Journal run,* i.e. searching in relevant journals;
- *Area scanning,* i.e. browsing areas in relation to other areas found in Earlier searches;
- *Subject searches,* and;
- *Author searching* (Booth, 2008).

By combining these methods, the meta-strategy *berry picking* was achieved (Booth, 2008). Such tactics are prominent in systematic review methods (ibid), which is the literature review method used by the authors in this thesis. The search for literature has been conducted using LUBsearch and Google Scholar, two peer-reviewed databases. To avoid omitting other sources of evidence, books and *grey literature*, i.e. white papers from consulting and research agencies as well as other institutions, were used in addition to the literature found using these databases.

These are examples of keywords used in the theoretical background: “forecasting”, “foresight”, “environmental scanning”, “long-term planning”,

"long-term foresight", "strategic foresight", "foresight activities", "corporate foresight", "strategic management", "horizon scanning", "monitoring", "strategic intelligence", "defense and civil security industry", "strategy", "future studies", "foresight research methods", "selection of foresight methods", "external collaborative foresight", as well as synonyms and comparable phrases.

The systematic review method has emerged to avoid a lack of thoroughness and biases from the authors (Tranfield, Denver & Smart, 2003). The use of such a review method further provides a clear and structured path for decisions, procedures, and conclusions for the reviewers (ibid).

2.2.2 **Contextual interviews**

2.2.2.1 Selection of interviewees

The contextual interviews consist of interviews with individuals within the case organization, individuals within the area of defense, and individuals within industries with similar characteristics as the DCS industry.

The respondents from the case organization were chosen in consultation with Saab and represent a wide variety of positions and BAs, all with relevant experience within strategic foresight or specific expertise in their area.

Respondents within the area of defense were interviewed to provide a further context of the industry and are knowledgeable both within foresight and the industry as such. These individuals were identified through a combination of identification of authors of studies found in the literature review, a dialogue with Saab, and *snowball sampling* (Denscombe, 2010), i.e. a sample that emerged as a result of references from previous interviewees.

After identifying relevant industries with similar characteristics, E.ON, Preem, Husqvarna, and the Swedish Transport Administration (STA) were contacted. The choice of companies was attributed to the similarities they share with the characteristics of the DCS industry, as follows:

- E.ON and Preem, both have long investment horizons and development cycles as well as pro-actively adapt to policy demands.
- E.ON, as well as the STA, constitute important functions for society by providing power grids and infrastructure, respectively.

- Moreover, the STA and the government are mutually dependent as the government allocates the STA's amount of resources, and the STA impacts the national infrastructural planning.
- Lastly, Husqvarna was identified through an interviewee referral from Saab as a result of their solid foresight activities enabling them to identify the need for a transition from chainsaws with combustion engines to electric-powered ones. In essence, Husqvarna's long-term strategic foresight work focuses on environmental aspects.

2.2.2.2 The process of the contextual interviews

According to Höst et al. (2006), interviews can be unstructured, semi-structured, or structured. A semi-structured interview method was chosen for the contextual interviews, given the descriptive and explanatory purpose of the research questions coupled with the possibility to ask both open and fixed questions. The respondents were able to explain their experiences of, thoughts on and participation in strategic foresight work. To provide the answers from each respondent with context, questions were asked to gather background information about the interviewee, e.g. BA, level of involvement in foresight activities and position. Moreover, as suggested when conducting semi-structured interviews, by both Höst et al. (2006) and Bryman (2012), all interviews were recorded after oral consent to ensure that the responses were correctly perceived and to avoid loss of information.

Three interview guides (one for each category, i.e. Saab, the area of defense and organizations within similar industries) were constructed based on the research questions with guidance from the structure provided by Bryman's (2012) sequential steps. Moreover, the ethical principles of Diener and Crandall (1978) have guided the authors of this thesis when constructing the interview guides. After constructing a first draft of the interview guides, they were discussed with the supervisors at Saab and the university in order to gain input before proceeding with the interviews. All three interview guides can be found in Appendix A.2.

2.2.3 **Delphi study**

2.2.3.1 Selection of participants

The foresight experts participating in the Delphi study were chosen based upon identification of authors in the literature search as well as through the World Futures Studies Federation (WFSF), who forwarded a request to their

network of researchers, practitioners, and futures-focused institutions. Additional participants were also identified through snowball sampling. All foresight experts participating in the Delphi study are presented with anonymization in Appendix B.1.

The participating experts formed a heterogeneous group with diverse backgrounds and experiences in terms of industry expertise, educational background, and nationality. The final sample represented respondents from seven countries on four continents. According to Habibi, Sarafrazi and Idzavar (2014), using a heterogeneous group in a Delphi study is preferred over a homogeneous group. As regards the number of participants, there are no precise recommendations, but different articles and practitioners state that between five and twelve respondents are adequate (ibid). Moreover, according to Okoli and Pawlowski (2004) as well as Denscombe (2017), a minimum of ten experts is considered enough in order to ensure credibility. The sufficient size may differ depending on the topic covered as well as the time available (ibid). These recommendations have been followed in this thesis, as could be seen in Figure 2.4.

2.2.3.2 The process of the Delphi study

The process of the study in this thesis followed the typical steps of the Delphi methodology as described by Denscombe (2017) and is outlined in further detail in Figure 2.4. A total of 75 individuals received an initial request based on their area of expertise and the likelihood of them participating. Thereafter, the first-round survey, constructed through the platform *Sunet Survey*, was sent out to those who confirmed their participation. The responses were then analyzed and composed into a first synthesis before the second-round survey was created and sent out. Finally, the answers from the second round were analyzed and compiled into the final synthesis.

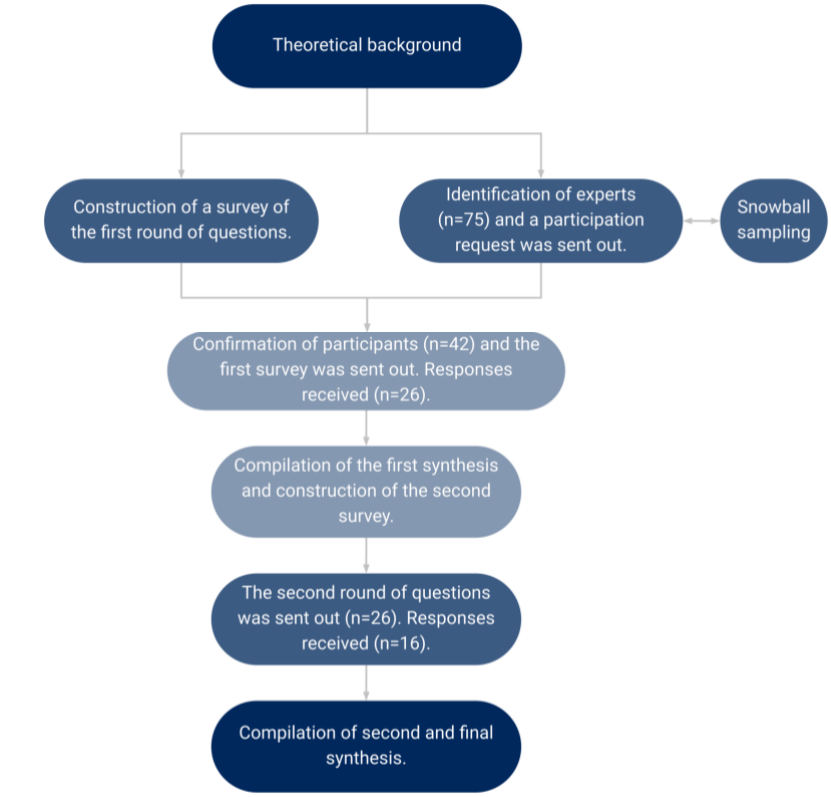

Figure 2.4. Visualization of the Delphi study process, where *n* corresponds to the number of experts in each step.

The first round of the Delphi study consisted of 24 questions. A short summary of the industry's main characteristics was provided at the beginning of the survey to ensure that all respondents had a basic understanding of the industry. This was done for the respondents to better be able to determine if their knowledge and experience in foresight could be applicable also in the context of the DCS industry. The second round of questions consisted of ten questions that delved deeper into some of the questions asked in the first round; either due to diverse answers, or to further examine subjects brought up by the respondents. Questions from the first round were also given further constraints in order to examine if the answers changed compared to the first round. However, the focus of the second round was to achieve a consensus of the combination of methods mentioned by the respondents in the first round.

Finally, the respondents were asked to confirm that they allowed their contribution to be mentioned in the report. The complete surveys used in both

rounds of the Delphi study as well as the complete syntheses are to be found in Appendix B. A summary of the syntheses is found in section 4.2.

The Delphi study conducted in this thesis is a condensed version with two rounds of questions, which was identified to be enough given the time and resources available in the scope of a master's thesis. Its weighted value to the other components of the data collection was also considered. According to Denscombe (2017), a Delphi study normally consists of three or four rounds. Two rounds are, however, considered to be enough (Denscombe, 2017, Habibi et al., 2014; Skulmoski, Hartman & Krahn, 2007). Habibi et al. (2014) further highlight that the decision is pragmatic and that various sources report numbers ranging from two to ten rounds.

By using the format of an online questionnaire, it was possible to include experts from various locations and thereby gain a wider range of perspectives, an important factor when conducting small-scale research with limited resources (Denscombe, 2017). As recommended by Höst et al. (2006) both rounds of the survey were tested iteratively through small pilot studies in order to ensure quality, understanding, and effectiveness of the questions before the final versions of questions were sent out to the experts. The surveys were constructed with respect to the time required by the participants and resulted in an estimated total time of 30 minutes for both rounds of questions. The character of the questions varied between quantitative and qualitative, where Likert scales, multiple-choice questions, and matrices were used for quantitative questions and free text answers for qualitative questions. To lower the barriers for participation, as well as to increase the ease of analysis, the questions were compiled with regards to minimize the need to write text.

2.3 Analysis

According to Höst et al. (2006), the process of qualitative analysis can be divided into four schematic steps. Such a structure creates traceability, which allows following how the conclusions were drawn from the material (ibid). A qualitative study with its flexible character enables the steps outlined below, presented by Höst et al. (2006), to be iterated several times:

1. *Data collection*, as described in section 2.2.

2. *Coding,* i.e. allocating studies to one or several keywords. This process created a foundation for decision making regarding focus areas and patterns in the next step.
3. *Grouping,* i.e. categorizing the coded text segments into groups to enable visualization of the identified patterns. This enabled the creation of new theories and concepts to be tested and verified through an iteration of the previous steps.
4. *Conclusions,* i.e. drawing conclusions based on the grouped data that can be verified. This was done throughout the process to assure validation and quality as well as avoiding bias. The quality assurance process is further described in section 2.6.

Overall, the data analysis process follows the ladder of abstraction presented by Miles and Huberman (1994). This progression is illustrated in Figure 2.5, consisting of three levels. The first two steps have a descriptive character that in step three moves towards an explanatory one, which follows Miles and Huberman's (1994) definition of analytical progression.

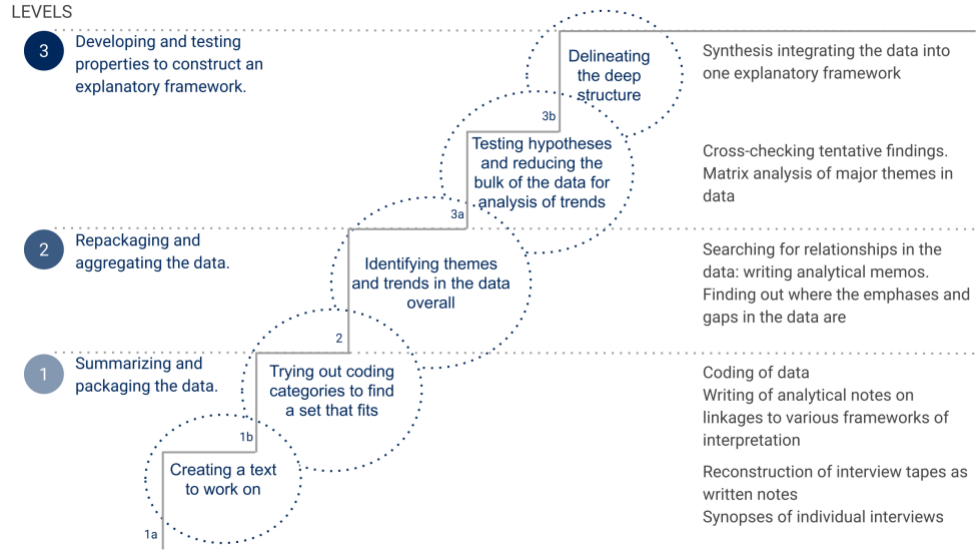

Figure 2.5. The ladder of abstraction (adopted from Miles and Huberman, 1994).

2.3.1 **Analysis of results from contextual interviews**

In order to enhance the qualitative rigor of the thesis, the process of coding and grouping has followed the approach described by Gioia et al. (2012). This approach facilitates a structured presentation of the data analysis by

organizing it into first and second-order categories that are later assembled. First-order analysis refers to informant centric codes, while second-order analysis refers to research-centric concepts (ibid). Moreover, Gioia et al. (2012) argue that by combining first and second-order analysis, a demonstration of qualitative rigor of the links between the data and induction of new concepts is allowed. In this thesis, the first-order analysis was structured in a Microsoft Excel document, analyzing different phrase codes from the interviews to enable transparency and traceability. The second-order analysis in the thesis consisted of categorization of the coded text segments into themes. Four iterations of themes were performed in this second-order analysis for the contextual interviews, which allowed for condensation of nearly 270 phrases into five final aggregated dimensions. The complete set of first and second-order themes as well as aggregate dimensions constitute the data structure. A graphical representation of the progress from raw data from the contextual interviews into terms and themes is presented in Appendix A.3.

2.3.2 **Delphi study**

For the analysis of the Delphi study, questions with a quantitative character were compiled automatically through the survey system, as well as manually in Microsoft Excel, whereas comments and open-ended questions were coded in line with the process of data structuring by Gioia et al. (2012). The qualitative analysis thus resulted in different themes and the quantitative analysis in mean values indicating the most frequent answers. Based on the analysis from the first round of answers, a prototype framework for conceptual strategic foresight was constructed for validation in the second round. Finally, the answers in the second round were analyzed and coded equivalently with the first round of questions in order to compile the final synthesis.

2.4 Ideation of the conceptual framework

The final step of the thesis consisted of ideation and creation of the final conceptual framework. This framework was defined, in accordance with Miles and Huberman (1994), as a framework explaining, mainly graphically, but also in narrative form, the main aspects to consider in long-term foresight activities. These aspects consist of the key factors, constructs or methods as

well as the presumed relationships and connections between them. The final conceptual framework in this thesis aims to be the outset for a company within the DCS industry to further examine the possibilities of working with long-term (+20-40 years) strategic foresight.

Furthermore, Miles and Huberman (1994) note that a framework should consist of bins, derived from theory, experiences, and other general objectives of the study envisioned, as well as connections in between them. Therefore, the process started with creating bins, naming them, and constructing their interrelationships based on results from the data collection and analysis. As outlined in Figure 2.5, Miles and Huberman (1994) explain that this process compels selectiveness regarding which variables that are most important, what relationships that are most effective, and meaningful as well as what aspects and information that should be analyzed.

2.5 Research Ethics

Diener and Crandall (1978) have broken down ethical principles for research into four main areas, shown and evaluated upon in the list below.

1. *Whether there is harm to participants*
   Throughout this thesis confidentiality and anonymity issues have been negotiated with interviewees and survey respondents. In cases where it has been requested, it has been honored. Confidential information gathered through discussions with the case company, Saab, have been treated likewise. Consequently, confidential parts have been disregarded in the official publication of this thesis.

2. *Whether there is a lack of informed consent*
   The research participants have been given information about what the research aims to examine, its purpose, the length and nature of their involvement, and how their data will be used. They have also been informed that the thesis is carried out in collaboration with Saab. This is done to assure that the research participants can make an informed decision regarding their wish to be involved in the study or not. Oral consent was requested from the interviewees, confirming the permission to record and transcribe the interviews. The interviewees were further offered to take part of the material from the interviews

to ensure that the received information was correctly interpreted. Ultimately, to conform to the principle of informed consent.

3. *Whether there is an invasion of privacy*
   The principle of privacy is linked to the principle of informed consent as the latter needs to acknowledge the right to privacy. For all research participants, an anonymized contextual description has been provided and the level of information presented has been confirmed by all participants.

4. *Whether deception is involved*
   The researchers have provided the research participants with a clear definition of the research and its purposes, in order to ensure that deception among the research participants is avoided.

Apart from these four principles, the gathered data has been handled according to applicable data protection legislation. The data has been available to the authors of this thesis only. It has been handled exclusively through computers belonging to Saab. In addition, even though the thesis is publicly available, the authors have reassured that all research participant was given the opportunity to access the final version of the thesis in order to confirm reciprocity.

2.6 Quality of Research

For the research to be credible, it must demonstrate that the findings are based on such practices that are recognized as bases of good research (Denscombe, 2010). In order to assess the quality of research in this thesis, the pragmatic approach used by qualitative researchers (e.g. Miles and Huberman, 1994; Silverman, 2006) has been applied. Such an approach consists of the following elements: credibility, dependability, transferability, and confirmability.

2.6.1 **Credibility**

The credibility criterion refers to the appropriateness of the data being used for the investigation of the research questions (Denscombe, 2010). According to Höst et al. (2006), the use of several methods for studying the

same entity can be used to increase the validity of the study. This was achieved firstly by triangulation from combining data from contextual interviews as well as from having several foresight experts participating in the Delphi study. Secondly, it was achieved by respondent validation which was enabled in the second round of the Delphi study.

2.6.2 **Dependability**

The dependability criterion refers to the possibility of another researcher arriving at the same results, i.e. whether the researchers use reputable procedures and make reasonable decisions (Denscombe, 2010). By providing the reader with information about the lines of inquiry that led to conclusions in as much detail as possible, the dependability was increased.

2.6.3 **Transferability**

Inevitably, the use of a single representative case raises the question of how many similarities can be found in similar cases. Generalizability refers to the projection of findings from the research to similar phenomena at a general level (Denscombe, 2010). Lincoln and Guba (1985) argue that the criterion transferability should replace generalizability in qualitative research, as this would shift the focus of projection to rather focus on to what extent the findings could be transferred to other instances. This case study of Saab is focused on aspects of foresight that are generic to the DCS industry. However, this raises the question of whether the findings can be transferred to an even broader context which is further discussed in section 6.3.

2.6.4 **Confirmability**

Denscombe (2010) refers to the confirmability criterion to the absence of bias in the research, i.e. that the research is unprejudiced and neutral as well as that the data collection and analysis are treated fairly. He further argues that it should be acknowledged that qualitative data are the product of a process of interpretation. Hence, the research can never be free from the influence of those who conduct it. To mitigate the impact of the involvement of the researchers' self, the authors of this thesis have attempted to distance themselves from their everyday beliefs and judgments and have also acknowledged that their personal experiences may have shaped the research

agenda. Moreover, the authors have recognized to approach the analysis of data with an open mind. This was achieved by incorporating all data and avoiding neglecting deviant data that did not fit the analysis. An open mindset was also applied by the authors by striving to explore alternative, rival explanations, and questioning their own. This was achieved through theory triangulation, as well as in the second round of the Delphi study by letting foresight experts either confirm or reject the combination of theory and synthesis of the first round.

3 Theoretical Background

This chapter presents the theoretical background in the area of foresight. Possible options for choosing macro-factors, extant research on foresight methods, and the relationship between foresight activities and time horizons are presented. Finally, the organizational aspects of foresight activities are discussed.

3.1 Introduction to Foresight

Strategy can be divided into three quite separate but mutually interdependent activities: strategic thinking, strategy development, and strategic planning (Voros, 2003). Voros (2003) argues that strategy development is the link that connects strategic thinking with strategic planning by enabling organizational decision-making. As foresight is an input into the strategic process, that in turn guides strategic planning by enabling more insightful decisions, the term foresight is an element of strategic thinking (ibid), as shown in Figure 3.1.

Figure 3.1. Three levels of strategy (adopted from Conway's (2016), development of Voros, 2003).

Miles and Keenan (2002) further stress that the strength of foresight lies in its structural, participatory, future-intelligent, and medium- to long-term vision-building processes, as well as in guiding current decisions and

mobilizing collaborative efforts. Berger, Bourbon-Busset and Massé (2008) argue that foresight is built upon three assumptions: several futures are possible, change can be identified, and the future can be influenced. In contrast to traditional forecasting, which seldom manages to predict the future in turbulent times, foresight generates a platform to develop potential futures (Magruk, 2015). The following is one of the most popular definitions of foresight, proposed by Ben Martin and John Irvine in 1983 (Magruk, 2011, p. 701):

> *Foresight is the process involved in systematically attempting to look into the long-term future of science, technology, economy, and society with the aim of identifying the areas of strategic research and the emerging generic technologies likely to yield the greatest economic and social benefits.*

Moreover, the European Commission (2012) states that foresight is characterized by the following features: a long-term orientation, examination of a wide variety of factors, and the use of formal methods and techniques that allow for legitimacy and consistency. Becker (2002) presents two drivers and overarching objectives for firms' corporate foresight activities. They are either (1) a consequence of the specific characteristics of the organization's business operation, which naturally demand a long-term orientation, or (2) proactively performed in order to better focus on the firm's responsiveness to general uncertainties in their business environment (ibid).

3.1.1 **Concepts within the futures domain**

As in many nascent research fields, the use of terminology within foresight is ambiguous. Kuosa (2011) describes and differentiates some of the most common futures field related concepts and practices, each with corresponding primary, secondary and tertiary aims or aspects. This compilation of concepts aims to introduce the reader to the futures domain and is shown in Table 3.1.

Table 3.1. The meaning of concepts in the futures domain (adopted from Kuosa, 2011).

Concept	*Primary*	*Secondary*	*Tertiary*
Strategic foresight	Policy Orientation	Insight	Alternatives
Corporate foresight	Policy Orientation	Vision	Insight
Horizons scanning	Insight	Assessment	Participation
Technological assessment	Assessment	Participation	Planning
Forecasting	Assessment	Predictions	Insight
Long-range planning	Planning	Assessment	Policy Orientation
Scenarios	Alternatives	Planning	Vision
Futures studies	Vision	Pro-activity	Alternatives

However, Kuosa (2011) does not explain the interrelationships between these different concepts. Contrarily, Rohrbeck et al. (2015) distinguish the interrelationship between two of the main concepts, strategic foresight and corporate foresight; two terms that have insufficient differentiation from each other. Corporate foresight represents the stream aiming to emphasize the focus on strategic foresight in an organization by integrating theoretical foundation from management theory with empirical evidence from research related to strategic foresight, while the other stream focuses more on national policymaking (ibid). However, both streams share commonalities such as generic processes and methods (ibid). To avoid that processes or methods commonly used for policies are excluded or disregarded, which potentially could be applied also in an organizational context, the authors of this thesis have chosen to predominantly use the term strategic foresight. In addition, the extant research on corporate foresight is slim because its output and the methods used often are restricted by confidentiality, as they are used as a basis for achieving competitive advantage (Daheim & Uerz, 2008).

3.2 Macro-factors

Vecchiato and Roveda (2010) present three criteria useful when setting the frame for foresight activities in corporate organizations; time horizon, scope of analysis and field as illustrated in Figure 3.2.

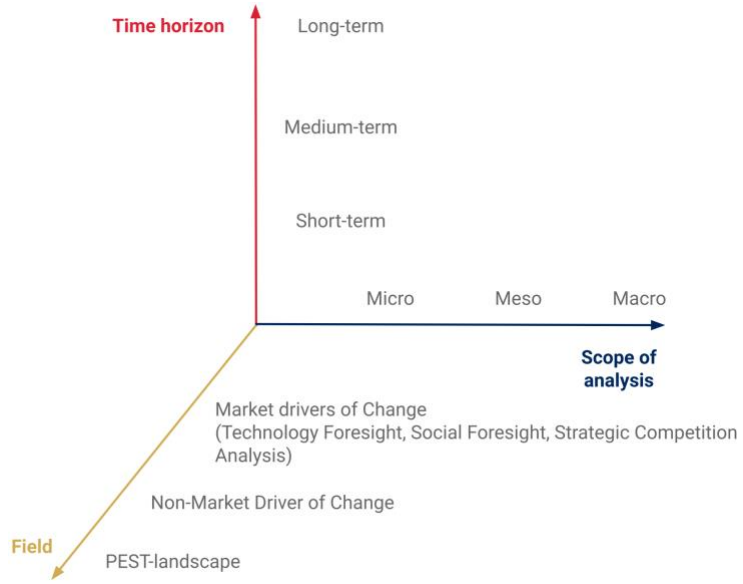

Figure 3.2 The three main dimensions that classifies strategic foresight in corporate organizations (adopted from Vecchiato and Roveda, 2010).

The time period being considered is tightly intertwined with the activity's scope of analysis (Vecchiato & Roveda, 2010). In turn, the scope of analysis incorporates three classifications that Becker (2002) explains as follows:

- *Micro-level*, i.e. foresight activities targeting specific research projects
- *Meso-level*, i.e. foresight activities covering one specific field of science, area of technology or sector,
- *Macro-level*, i.e. foresight activities covering a specific range of domains.

Moreover, while micro-level foresight most often concerns short- and medium-term, addressing urgent and practical problems, e.g. sales figures for specific goods and regional markets, foresight at meso-and macro-levels appears to be long-term (Vecchiato & Roveda, 2010). As regards the field axis, Morrison (1986) argues that by enabling the detection of macro-factors such as political, economic, social, and technological factors, the future strategic context can be defined. Lundqvist (2010) further states that also other elements, important to the organization should be considered. For companies operating within a sector with societal embeddedness, a broader social, political, or regional aspect must further be taken into account (Becker, 2002).

Furthermore, Becker (2002) states that scanning of macro-factors is a substantial and often initial step in the foresight process and development of a corresponding corporate strategy. Accordingly, it is the first step in several existing foresight frameworks, e.g. Voros's (2003) or Bishop and Hines' (2012). Hence, through scanning of macro-factors within a defined time horizon and field, decision-makers can anticipate what is happening and what will happen in its surrounding environment which allows for informed decision-making of the organization's long-term and overall policy and plans (Morrison, 1986).

3.2.1 **The selection of macro-factors**

Jonsson and Sonnsjö (2010) highlight the fact that the selection and clustering of external variables are dependent on who will use the material as well as why and how it will be used. How these variables are presented or clustered will, therefore, affect the implication of the analysis (Jonsson & Sonnsjö, 2010). Becker (2002) presents examples of important factors for companies in different industries, such as transportation, automotive engineering as well as ICT. For instance, regulative and environmental aspects are more important within the areas of transport and automotive engineering, while communication and leisure behaviors are important in the fields of ICT. Consequently, those factors also play a bigger role in the foresight activities of firms in those sectors (ibid).

Gasinska and Eriksson (2018) have made a study of 50 reports regarding security policy foresight from which they conclude that most of the examined reports were lacking an explanation of how the selection of factors had been made. Moreover, they recognize technology as a factor examined in all reports and demography, military and security as commonly investigated aspects in almost all reports. Contrarily, other actors in the DCS industry have deliberately chosen to exclude categories such as security or military aspects, as they would probably only confirm the known or what is already known and increase the risk of trivial circular reasoning (Jonsson & Sonnsjö, 2010).

While the selection is dependent on the type of industry, Gasinska and Eriksson (2018) point out that the time horizon of succeeding foresight activities is another important aspect. As an example, they mean that it is challenging to predict some technological trends over a medium- or long-

term horizon, while demographical trends are considered more stable over time. This discussion corresponds to the reasoning of Bishop and Hines (2012), who exemplify that climate change can be analyzed over a longer time horizon since significant environmental changes take time, while political changes often are dependent on election cycles and therefore change more rapidly. They further note that even though significant changes can occur rapidly in any domain, that is not usually the case. Instead, change and variance become more visible during a longer time horizon (at least 10-20 years ahead), since changes in the global environment evolve slower, and thereby have delayed effects (ibid). Therefore, Bishop and Hines (2012) argue that a broad vision of the world is required in order to understand long-term change and what might happen in the future.

Another aspect regarding the selection of macro-factors is that external developments repeatedly have taken an unexpected turn according to the Swedish Ministry of Defense (MoD) (2019). While such changes often have occurred within the context of a broader trend, their occurrence have for most assessors emerged as completely unforeseen (The Swedish MoD, 2019). As a result, the Swedish MoD (2019) means that future assessments must also include such developments that are considered less likely, but whose consequences, if they were to occur, would be serious. Such events could be defined as *black swans* (Taleb, 2007) or *wild cards* (Voros, 2003; Glenn & Gordon, 2009). Both are characterized by rarity, extreme impact, and retrospective predictability (Glenn & Gordon, 2009; Taleb, 2007). However, to distinguish between the two, *black swans* appear within the context of the examined issue (Taleb, 2007), while *wild cards* instead appear from outside of the studied domain (Voros, 2003).

Furthermore, Wilkinson and Kupers (2014) argue that by actively and regularly incorporating scanning of disruptive events, it is possible to contribute to a strategic early warning system more successfully. Thereby, it is possible to avoid being stuck in the trap of confirmation bias – searching only for indicators that things are going as expected (ibid).

3.2.2 **Tools for combining macro-factors**

There are many ways to combine macro-factors within foresight activities in order to facilitate the understanding and analysis of changes in the external environment and context (Bishop & Hines, 2012; Gasinska & Eriksson,

2018; Jonsson & Sonnsjö, 2010). STEEP is a commonly used tool that combines macro-factors representing social, technological, economic, environmental and political factors (Bishop & Hines 2012; Durst et al., 2015; Gasinska & Eriksson, 2018; Goux-Baudiment, 2016; Jonsson & Sonnsjö, 2010; Lum, 2016; United Nations Development Programme (UNDP), 2018; Wahlström, 2015). The STEEP model contributes with a relatively complete image for a specific area, but risks being too generic according to Jonsson and Sonnsjö (2010). Therefore, the STEEP model sometimes is used as a foundation that can be modified by adding or removing factors depending on the purpose (Durst et al., 2015; Goux-Baudiment, 2016; Jonsson & Sonnsjö, 2010; Popper, Keenan, Miles, Butter & Sainz, 2007; UNDP, 2018). PESTLE is one example of a modified version with the addition of a legal factor (Bishop & Hines, 2012; Durst et al., 2015; Gasinska & Eriksson, 2018; UNDP, 2018; Wahlström, 2015). The abbreviation PEST is further frequently used, excluding the legal and environmental aspects, or ESPT, as was the initial abbreviation used by the originator Aguilar in 1967 (Bishop & Hines, 2012).

Moreover, Gasinska and Eriksson (2018) argue that even if a framework is used, it is critical to acknowledge that trends should not be seen as separate entities. Instead, some trends are sub-categories of a broader macro-trend in an overarching framework – for example can demography be attributed to the societal aspect (ibid). They further emphasize that all such sub-categories used in macro-analysis can be attributed to a corresponding macro-factor and that this way of sub-categorizing within a broader framework is common.

Apart from using tools for combination of macro-factors, a wider analysis can be achieved by adding levels of regionality (ranging from local to global) and creating intersections by investigating how the macro-factors change within these regional levels (Buzan, Waever & de Wilde, 1998). Inspired by this, the Swedish Defense Research Agency (FOI) has developed the model ART, which creates intersections between analyses of actors, regions, and themes, i.e. chosen macro-factors, for foresight purposes within the SAF (Jonsson & Sonnsjö, 2010). This inclusion of a global, regional and national dimension is also applied in Poland's National Security Strategic Review, which outlines desirable directions and course of action for the Polish state (National Security Bureau, 2012).

3.3 Foresight Methods

Magruk (2015), as well as Goux-Baudimen (2016), highlight that foresight is a complex research area since methods for foresight activities originate from science within various fields. Magruk (2015) further explains that the creation of an optimal workflow is dependent on the purpose and context of the foresight process since different methods can be used in numerous ways. More specifically, Durst et al. (2015) suggest that the following should be considered when designing a foresight project: a comprehensive foresight process with an appropriate set of integrated foresight methods, a shared knowledge base, and collaborative decision-making.

In order to select appropriate methods for foresight activities, Alexandrova et al. (2007) formulated three aspects to consider:

- the list of possible methods should be exhaustive;
- knowledge of the characteristics of each method is crucial in order to understand its capacity and application;
- criteria should be decided upon and set to allow a selection of suitable methods and rejection of others.

These considerations will be further elaborated in the section below.

3.3.1 **Selection of foresight methods**

The first assumption – to use an exhaustive list of possible applicable foresight methods – is complicated by the fact that the number of methods appropriate for foresight activities is large and increasing (Magruk, 2011). Magruk (2011) has identified and compiled 116 methods applicable for foresight programs and Durst et al. (2015) have similarly made a compilation of 150 methods. In addition, certain parameters characterize the suitability of each method. The mindset of the project participants, the specific objective, context, resource, and culture will determine how well the method will perform (Durst et al., 2015).

As regards the second assumption – the importance of knowledge regarding characteristics of foresight methods in order to understand their features – various divisions and categorizations of foresight methods have been made by different authors (Magruk, 2015). The division of methods is in general made either by classification, i.e. a division made after the methods

characteristics, or by typology, i.e. a division into several phases (Magruk, 2015). Magruk (2015) himself presents a classification of methods consisting of ten categories, which, in turn, is based on other existing classifications and typologies. His classification facilitates a combination of contradictory methods; thereby, enabling triangulation (Aaltonen & Sanders, 2006; Government Office for Science (GO-Science, 2017; Magruk, 2011; Popper, 2008). Several other authors have made a typological division (e.g. Bishop & Hines, 2012; Durst et al., 2015; Gordon & Glenn, 2009; GO-Science, 2017; Goux-Baudiment, 2016; Saritas, 2006; Schulz-Montag, Jannek & Volkmann, 2010; Slaughter, 1997; Voros, 2003). Moreover, Durst et al. (2015) have taken the processes of Horton (1999), Sutherland and Woodroof (2009), as well as Voros (2003) into account, and created a merged version. Each step in the foresight process by Durst et al. (2015) can supported by suitable methods. This reduce both complexity and uncertainty while also supporting the value-creation process by ensuring the conversion from information (input) to action (output) (ibid). As we will see when presenting the final conceptual framework of this thesis, a typological division into phases has been adopted. This is elaborated in section 6.2.

Regarding the third consideration – that criteria should be decided upon and set to allow selection of suitable methods and rejection of others – it is argued that the choice of methods should be subordinated to issues of the study in a general meaning (Magruk, 2015). Magruk (2015) further lists that research methods should be tailored to the objective of the study and that the characteristics and complexity of the method as well as its diagnostic features should be considered as a selection criterion when choosing foresight methods. Also, Andersen and Rasmussen (2012) argue that decisive factors for such a choice is the objective of the foresight activities as well as the budget and duration of the project. The budget is significant for the possibilities of involving external actors, such as experts and consultants (ibid). It is further agreed upon that the choice of foresight methods should always depend on and be made after the aim and purpose of the project is determined, never vice versa (Alexandrova et al. 2007; Becker, 2002; Popper 2007; Popper 2008). Martin (1995) further argues that this is necessary to prevent certain interest groups from manipulating the project in order to advocate their own viewpoints.

3.3.2 **Combination of Methods**

According to Aaltonen and Sanders (2006), GO-Science (2017), Magruk (2011) as well as Popper (2008) only a combination of different, also contradictory methods, will result in proper results. Although it is recognized that several different methods and sources should be used, the exact number of methods or techniques used in different foresight projects varies (Popper, 2008). By investigating 886 foresight projects from different organizations, Popper (2008) found that the average number of methods used varied between five and six, as illustrated in Figure 3.3. However, Popper (2008), as well as Raban and Hauptmann (2016), acknowledged that the use of many methods enables a quality check. They emphasize that a large number of methods can be used as a measure of triangulation since the quality of the findings increase when various foresight methods are used to analyze one specific topic. Moreover, Andersen and Rasmussen (2012) acknowledge that the benefits of using several methods can be greatly enhanced if the foresight process is separated into smaller specified parts. This enables different phases to be carried out over months or years, with the potential for reflection and further creation of each part (ibid).

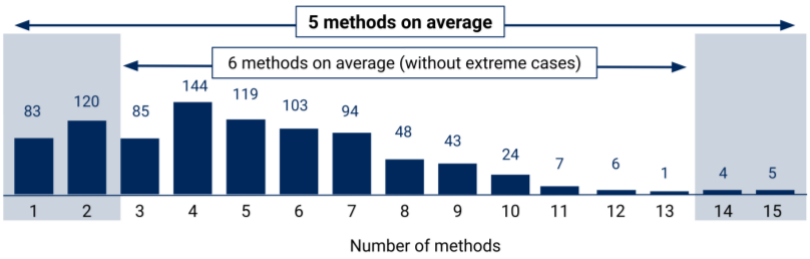

Figure 3.3. Number of methods used in foresight exercises based on an examination of 886 foresight projects (adopted from Popper, 2008).

Magruk (2015) further states that although there are several ways to combine methods, most disciplines, including foresight, use common methodological assumptions. The ten most common methods in Popper's (2008) study are illustrated in Figure 3.4. Overall, most of the methods used in the studied settings were of a qualitative nature (Popper et al., 2007). Moreover, in relation to the objective of this thesis, no clear pattern emerged explaining the relation between the choice of method and the time horizon used (ibid). One exception was the use of expert panels and scenarios that became more frequent with a longer time horizon (ibid).

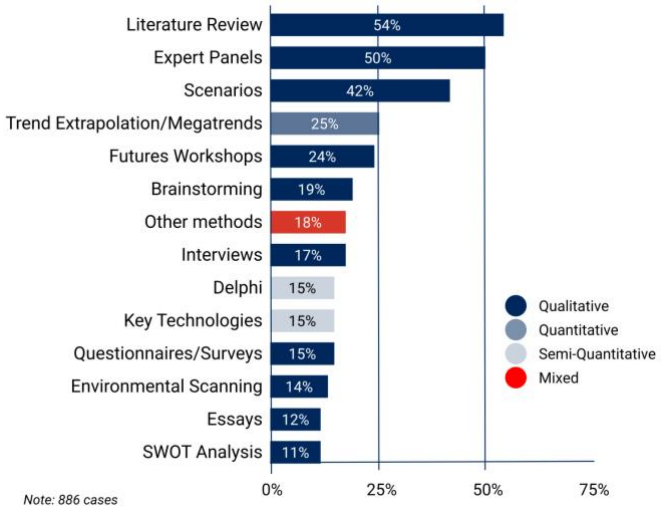

Figure 3.4. Nature of the most commonly used foresight methods (adopted from Popper, 2008).

In line with Magruk (2015), Becker (2002) shows that the use of rather simple tools dominates among firms. As these do not require extensive preparation or analytical robustness, they can be easily applied (ibid). Regarding more complex methods, findings of Durst et al. (2015) show that participants in foresight projects often struggle to understand these. Such methods are often used by firms that have their own think tanks and that apply causal and structural methods like scenarios and simulations, but also their own miniature versions of Delphi studies, future workshops, and future conferences (ibid). Becker (2002) further concludes a significant predominance of interaction-based and communication-oriented methods where there is great importance to involve a high proportion of interviews with internal or external experts and to test ideas during meetings or workshops. To facilitate such collaborative problem-solving, Durst et al. (2015) suggest different techniques like analytical modeling, morphological analysis, scenarios, multicriteria methods, or simulation to be implemented.

3.4 Multiple Futures

3.4.1 **Time horizons**

According to Rohrbeck (2010), strategic foresight should play a role in all time-horizons of strategic planning. Sharpe, Hodgson, Leicester, Lyon and Fazey (2016) illustrate this through three different horizons, as follows:

- The first horizon, H1: represents the current state and is sometimes referred to as business as usual.
- The second horizon, H2: represents the turbulent domain of transitional activities between H1 and H3.
- The third horizon, H3: represents an emerging future pattern that will be the long-term successor from H1. In this horizon, many different views of the future will be present until some dominant patterns emerge.

In addition, Sharpe et al. (2016) emphasize that all three horizons always are present, to a greater or lesser extent. As shown in Figure 3.5, H2- and H2+ underscore the fact that emerging trends in H2 can either be subsumed back into H1 or be the beginning of the emergence of H3, which is why all viewpoints must be linked (ibid).

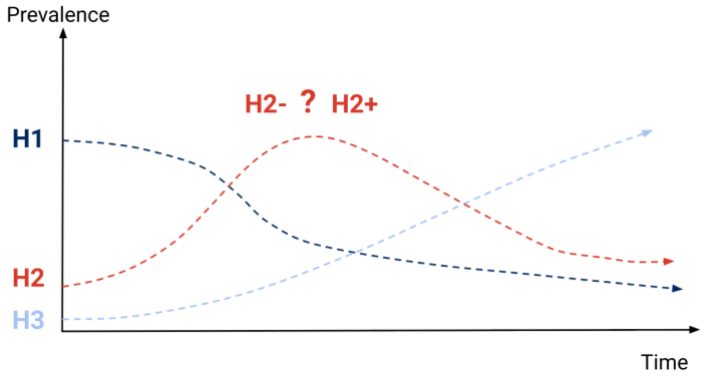

Figure 3.5. The issue of concern is dominated by the three horizons in relation to each other, the time, and the extent of the pattern (adopted from Sharpe et al., 2016).

The fact that there are multiple and not singular futures, especially when long-term perspectives are considered, is stressed by several authors (Berger et al., 2008; Bishop & Hines, 2012; European Commission, 2012; UNDP, 2018; Voros, 2003) and often visualized with the futures cone, Figure 3.6.

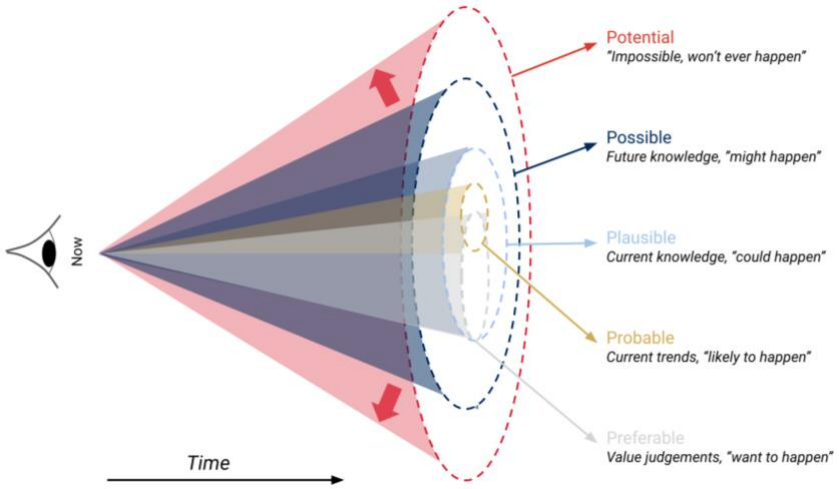

Figure 3.6. Potential outcomes in relation to the time aspect (adopted from Bishop & Hines, 2012; UNDP, 2018; Voros, 2003).

These multiple future images should stimulate and inspire decision-makers, to not be constrained by conventional thinking (European Commission, 2012). Voros (2003) explains these different perspectives as follows:

- *Potential futures* refer to an umbrella term covering all the other classes and include all futures, also those that cannot be imagined.
- *Possible futures* encompass all futures that can be imagined, regardless of how likely or absurd they might be.
- *Plausible futures* are a smaller sub-set than the possible futures and stem from current knowledge and understandings.
- *Probable futures* represent futures that to a large extent is a linear extrapolation of current trends or business as usual. This class of futures is much smaller than the previous, and thereby highlight the risks of studying a too narrow range of future outcomes.
- *Preferable futures* differ from the previous three mentioned classes since this range is not too concerned with cognitive knowledge. Instead, these futures are influenced by emotions, values, beliefs, and preferences of those identifying the different futures. As a result, these futures can lie in any of the other classes.

Like the description of H1 (Sharpe et al., 2016), the cone is narrow in the short run as there are only a few plausible alternatives and the certainty of what will happen is high (Bishop & Hines, 2012). However, with an expanding timeframe into the medium- and long-term horizon, referred to as

H2 and H3 by Sharpe et al. (2016), the range of possibilities and challenges expand (Bishop & Hines, 2012).

Furthermore, while uncertainty increases with the time-horizon, so does the magnitude of change (Gasinska & Eriksson, 2018). Becker (2002) further argues that appropriate information must be generated; it must be ensured that foresight activities are problem-oriented and that the findings or long-term trends are broken down and translated into current and more short-term decision-making options. In this context, a clear distinction should be made between the foresight activities that will provide guidance for product innovations and those that support innovation activities in general (ibid). Bishop and Hines (2012) therefore acknowledge that even if it is less satisfactory to deal with multiple possible futures, it is better than closing one's eyes and blindly throwing oneself into the future. As argued for by Tsoukas and Shepherd (2004), the purpose of a foresight process in an organization is not so much to predict the future as to prepare for it. Scenario planning is commonly used for such preparation – it can help to provide plausible explanations of what might happen in the future and create awareness of challenges and opportunities in a future that in essence is unknowable (Wilkinson & Kupers, 2014).

3.4.2 **Scenarios**

Andersen and Rasmussen (2012) present three types of scenarios, illustrated in Figure 3.7. These are predictive, explorative, and anticipative scenarios, of which the explorative scenario corresponds to the use of multiple futures.

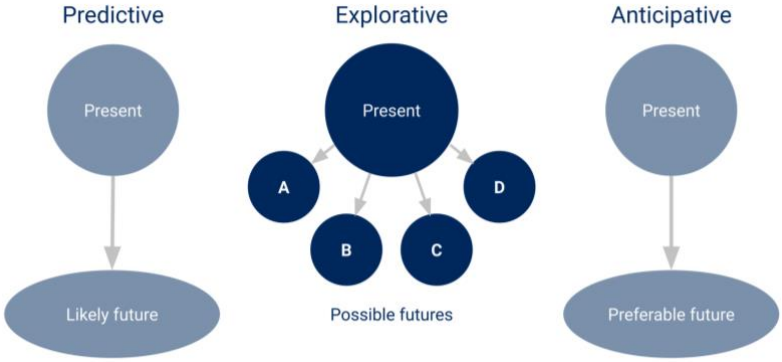

Figure 3.7 The three main groups of scenarios (adopted from Andersen and Rasmussen, 2012).

Moreover, by using explorative scenarios, decision-makers are forced to look beyond their rational bounds and mental models, which otherwise tend to

inhibit creative problem solving (Vecchiato & Roveda, 2010). It also enables organizational resilience, better preparedness for radical changes, and discontinuities (ibid). Miles and Keenan (2002) further note that scenarios are especially useful where several variables are involved and the degree of ambiguity about the future is high. Moreover, it is an appropriate method in order to encourage or accommodate change within an organization and when linking future possible events to the present (Saritas & Nugroho, 2012).

This resonates with the scenario planning adopted by Shell, the organization that has pioneered and sustained the use of scenarios in a commercial setting from 1965 until today (Wilkinson & Kupers, 2014). There are no evident examples of Shell better anticipating future developments than others, but Shell has more rapidly been catching on to changes (ibid). Instead, the value of their scenario planning lies in the manner of how scenarios are embedded in – and provide vital links between – organizational processes such as strategy making, risk management, and public affairs, rather than in foreseeing the future (Wilkinson & Kupers, 2013). Scenarios can also build social capital within, but also beyond the organization to support the communication with third parties and bringing about certain pictures of the future (ibid). Moreover, Wilkinson and Kupers (2014) highlight that there is an essential distinction to be made between scenarios and strategy; scenarios are about the future context of the organization, not the future of the organization itself. Thereby, scenarios are built to offer outside-in lookouts that are useful when placing new problems on the strategic agenda (ibid). Having the right balance between the two dimensions relevance and challenge is complex as there is a constant conflict between them (ibid).

Moreover, Wilkinson and Kupers (2013) argue that scenario planning helps organizations to see realities that would otherwise be ignored and make leaders comfortable with the uncertainty of an open future, as scenarios follow a pace distinct from the annual strategic cycle. They further state that it can counter hubris, contribute to a shared and systemic view, foster quick adaptation in times of disruption and crisis, as well as help resolve conflict while avoiding the extremes of groupthink and fragmentation. When Shell shifted from a decentralized structure – where scenarios served as corporate glue to hold the organization together by providing a common learning culture and refreshing the strategic agenda – towards a more centralized one, scenarios also provided a way to resolve disagreements about Group strategy and helped disturb the business-as-usual view that appears to arise from wishful thinking or linear extrapolation of current trends (ibid).

Furthermore, while the scenario technique has been praised as useful in developing foresight, various hurdles, particularly cognitive ones, exist (Bazerman & Watkins, 2004; De Geus 1997; MacKay & McKiernan, 2004; UNDP, 2015). Therefore, Schwarz, Ram, and Rohrbeck (2019) argue for a combination of scenario planning and business wargaming. While business wargaming reveals the future dynamics of an industry by focusing on the acts of the focal firm and its competitors, scenario planning is better suited to answer which new competitors that could enter the industry and how the boundaries of the industry can change (ibid).

3.5 Organizational Levels Involved in Foresight Activities

Vecchiato and Roveda (2010) state four different configurations concerning the organizational approach towards foresight activities. First, some companies have set up an independent and permanent entity with its own budget, consisting of full-time employees at the corporate or BA level. Second, foresight can be rooted in some strategic activities of corporate functions or BAs, and the tasks are then performed by a few individuals as one of their many tasks (ibid). For such a group, Wilkinson and Kupers (2014) argue that the diversity and quality of a foresight team is key to its success. A third option is to set up a temporary task force, which also may depend on the contribution of external experts, to deal with an issue on an ad-hoc basis (Vecchiato & Roveda, 2010). Finally, there is an increasing number of multi-client foresight projects, which are funded by several corporations and/or government agencies to resolve certain issues of mutual interest (ibid).

It has been argued that clearly assigned organizational roles, such as committed teams within certain functions or a temporary team, may help to incorporate foresight more deeply into the organization (Battistella, 2014; Vecchiatcho & Roveda, 2010). Wilkinson and Kupers (2014) further argue that irrespective if the group is temporary or permanent, the team members must feel as free as possible from departmental politics and be allowed to challenge. In addition, the dynamics between the foresight team and those who lead or work in other corporate functions are central to the use and usefulness of foresight analysis (ibid).

3.5.1 **Top-down and bottom-up**

In line with the different organizational approaches of Vecchiato and Roveda (2010), foresight activities often include elements structured both bottom-up and top-down (Becker, 2002; Cuhls et al., 2015). According to Becker (2002), several firms use a bottom-up approach, i.e. foresight groups that on own initiative scan the environment and report emerging issues to decision-makers, whereas only a few uses a top-down approach. In the latter case, top management requests an investigation of predefined objectives with core questions (Becker, 2002). Such top-down initiation of foresight practices, as well as management commitment, improves the reputation and authenticity of foresight (Battistella, 2014; Darkow, 2015; Martin, 1995; Rohrbeck & Gemünden, 2008).

Cuhls et al. (2015) investigated different horizon scanning cases and concluded that top-down approaches were conducted when the management required an overview of emerging issues for strategic reasons and positioning or in situations where topic or search field were clearly predefined and limited. A bottom-up approach was instead more common when specific topics were analyzed in further detail and thereby based on opinions of external experts or lower levels within the organization (ibid).

3.5.2 **Transforming mental models and disseminating information**

While the starting point for foresight activities might not always involve all levels within an organization, Vecchiato and Roveda (2010) argue that the real challenge of strategic foresight is to re-shape strategic beliefs and mental models of managers. Voros (2017) elaborates on this by stating that the nature of the output is two-folded; tangible and intangible. The latter might be difficult for some hard-headed, objective people to appreciate, assimilate, or even recognize (ibid). However, in line with Vecchiato and Roveda (2010), Voros (2017) points out that intangible output is undoubtedly the most important form since it alters the very mechanism of strategy or policy development itself, i.e. the perceptions of the mind(s) of the decision-makers involved in strategizing.

Furthermore, Becker (2002) highlights that not only the top management should be engaged and persuaded. Similarly, Hayward (2004) argues that it is crucial to understand the viewpoints of different individuals and

incorporate them into the process. Thereby, miscommunication is minimized and the probability of acting upon the information is maximized (ibid). In order to be successful and create a higher commitment within the organization, Hayward (2004) stresses that foresight activities, or at least the results, must be delivered and disseminated to relevant target groups. This suggests a careful engagement as well as consistent and accessible communication regarding long-term futures, as these tend to appear as dystopian or unrealistic (UNDP, 2015; Voros, 2017).

Additionally, Voros (2017) notes that there is a range of suitable methods for presenting the output of foresight studies. Further, Becker (2002) suggests that the development of practical example cases, in formats such as monthly magazines or an Internet resource, may be used to better convey foresight outcomes and practices, as well as to demonstrate the practical application of foresight. In line with these suggestions, Voros (2017) recommends workshops, reports, role-play, film, multimedia, and full-immersion experiential events to achieve the goal of widening the dissemination of the foresight work. Wilkinson and Kupers (2014) also argue that effective scenario engagement is accomplished by having excellent and convincing storytelling balancing between relevance and challenge that connect the scenarios to the interests of busy executives. In addition to effective presentations, they present the use of metaphors, images, graphical design, and illustrative numbers to help connect different communities within and beyond the organization as well as to aid comprehension. According to Cuhls et al. (2015) communication top-down, in the format of e.g., reports or newsletters is a well-functioning flow from the corporate function to officers or middle management. However, there are more struggles related to bottom-up communications, especially when attention is put on longer-range issues, which receives a lower priority compared to urgent management (ibid).

3.5.3 **Shortsightedness**

Laverty (2004) points out that companies tend to overvalue short-term rewards and undervalue long-term consequences. Becker (2002) further argues that shortsightedness is often derived from the shareholder value mindset of the top management, which simply does not put much emphasis on the long-term. Polier (2019) also stresses the tendency of organizations to be narrow-minded and myopic, as an explanation as to why sensors in distant areas or white spaces are inherently underdeveloped and need to be

specifically reinforced. This shortsightedness is mitigated when there are clear criteria for handling tradeoffs between short- and long-term outcomes, as well as when there is a climate of trust that allows individuals to cope with the short-term setbacks required to achieve long-term outcomes (Laverty, 2004). It can further be mitigated by setting up processes that enables and inspires employees to understand the possibilities of the future and how the organization will take advantage of those opportunities (ibid). In addition, it is beneficial to allow strategic foresight activities to follow a pace distinct from the annual strategic cycle since this enables a view of realities and uncertainty that would otherwise be ignored (Wilkinson & Kupers, 2014).

3.5.4 **Internal collaboration**

Becker (2002), as well as Beşer and Öner (2011), have noted that corporate foresight activities often are extremely fragmented, meaning that the activities are too segmented, specialized, and uncoordinated to provide a complete picture. Such an insufficient internal network results in double work, insufficient re-use of earlier work, and neglected synergies (Becker, 2002). Organizational fragmentation is also often perceived to have a detrimental impact on focusing objectives and is referred to as organizational silos. Forsten-Astikainen, Hurmelinna-Laukkanen, Lämsä, Heilmann, and Hyrkäs, (2017) argue that in order to avoid such harmful outcomes, competence management is called for. They further argue that the utilization of communities of practice (CoPs), that build on common interests, effectively can cross organizational boundaries. Following the same line of argument, du Plessis (2008) argues that CoPs can break down organizational silo behavior. Moreover, du Plessis (2008) argues that CoPs are excellent platforms to ease the flow of information between people in different areas of an organization and make them aware of what is happening in other areas where they normally are not involved. Hence, it allows cross-boundary creation and sharing of knowledge and therefore also acts as a catalyst for innovation (ibid). These features of CoPs allow them to ease information transfer and decompose the destructive isolation (ibid).

Internal collaborative approaches to foresight activities can also enhance organizational resilience since a broader variety of perspectives improves ideation, problem definition, and consensus in long-horizon strategies and thereby result in improved strategic options (Weigand, Flanagan, Dye & Jones, 2014). In line with this, Becker (2002) states that foresight needs to be

more deeply rooted in the corporate culture, e.g. via monitoring systems, future workshops, or in mission and vision statements. Interviews and workshops are further stated by Gattringer and Wiener (2020) to be fruitful in the initial phase of collaboration, in which there often is a fear of handling confidential information. Interviews have also been successfully applied by Shell to help in scoping the agenda before building a set of scenarios and in testing assumptions that executives made about the future that would otherwise have remained implicit (Wilkinson & Kupers 2014).

3.5.5 **External collaboration**

Day and Schoemaker (2004) as well as Durst et al. (2015) stress that relying on internal sources alone poses a risk of blind spots with respect to environmental changes arising at the periphery of the firm's business. Hence, there is great importance of leveraging external actors to expand the scope of a firm's peripheral view (Becker 2002; Day & Schoemaker, 2004). Also, Gattringer and Wiener (2020) argue that collaborative efforts can be useful in mitigating challenges that often occur in the realization of strategic foresight activities, such as low methodological know-how, influence from existing mental models, difficulties in broadening organizational horizons and the development of out-of-radar knowledge. As a result, it has been emphasized that improved cooperation between different foresight exercises, both between different companies and sectors, becomes increasingly important (Becker, 2002; Janowicz-Panjaitan & Noorderhaven, 2009; Rohrbeck et al., 2015). According to Becker (2002) such cooperation would be beneficial to save a lot of double work as well as to gain a broader database for decision-making. Accordingly, Heger and Boman (2015) argue that it is difficult for organizations to recognize future developments on their own, due to the complexity and uncertainty of the surrounding environment. A more open approach to foresight also emphasizes the openness towards the distant environment to enable disruptive thinking and challenge current assumptions and mindsets of the organization (Daheim & Uerz, 2008).

Moreover, inclusion of science-related sources such as consultants, experts, universities, and public or private research institutes, is further proposed to gain exposure to useful sources of innovation (Del Giudice et al., 2014; Henttonen, Ritala, & Jauhiainen, 2011; Nieto & Santamaría, 2007). Interactions with universities and academic institutes provide access to cutting-edge knowledge in different fields of expertise and thereby provide

the organization with essential information of emerging technologies to expand the firm's knowledge base (Cappelli, Czarnitzki, & Kraft, 2014; Henttonen et al., 2011). Mad Scientist, a U.S. Army initiative, is one example of such an effort; it is a community that seeks to explore the future in order to assist the U.S. Army in shaping future multi-domain operations through collaborative partnerships and continuous dialogue with groups outside the military and defense industry, such as academia, industry, and government (STAND-TO, 2018). Boudreau, Lacetera and Lakhani (2016) further state that science specialists who apply extensive expertise of a specific field may offer new insights since they typically interpret a larger range of facts and can perceive complicated trends and interpretations. These experts can be a valuable source of innovation in dynamic, information-intensive fields that need specialized background information (de Boer et al., 2012).

According to Cohen and Levinthal (1990) as well as Köhler et al. (2012), firms require specialized absorptive capacity and may even need to engage in joint research activities to enhance the full value of scientific knowledge. However, Becker (2002) also denotes that such collaborative efforts require the development of a common methodological foundation, cooperative processes and standards in order to facilitate management and integration of common foresight activities. One move in this direction is to arrange more common foresight meetings with futurists from other companies to share their insights on trends and drivers as well as to jointly examine the interactions between new developments (ibid). However, conflicting interests based on divergent organizational objectives, or different mental models can lead to discouragement and a lack of communication and knowledge sharing between organizations or between entities within an organization (Khanna, Gulati & Nohria, 1998; Larsson, Bengtsson, Henriksson & Sparks 1998; Nooteboom, van Haverbeke, Duysters, Gilsing, & van den Oord., 2007; Yang, Fang, Fang & Chou, 2014). Nevertheless, long-term orientation, collective awareness, and trust have been noted as approaches that can manage these challenges (Larsson et al., 1998; Muthusamy & White, 2005; Janowicz-Panjaitan & Noorderhaven, 2009; Yang et al., 2014).

4 Analysis

This chapter presents the analysis of the empirical results from the contextual interviews and the Delphi study, presented through five main themes: the DCS industry landscape, organizational considerations, processual aspects, resources and, macro-factors.

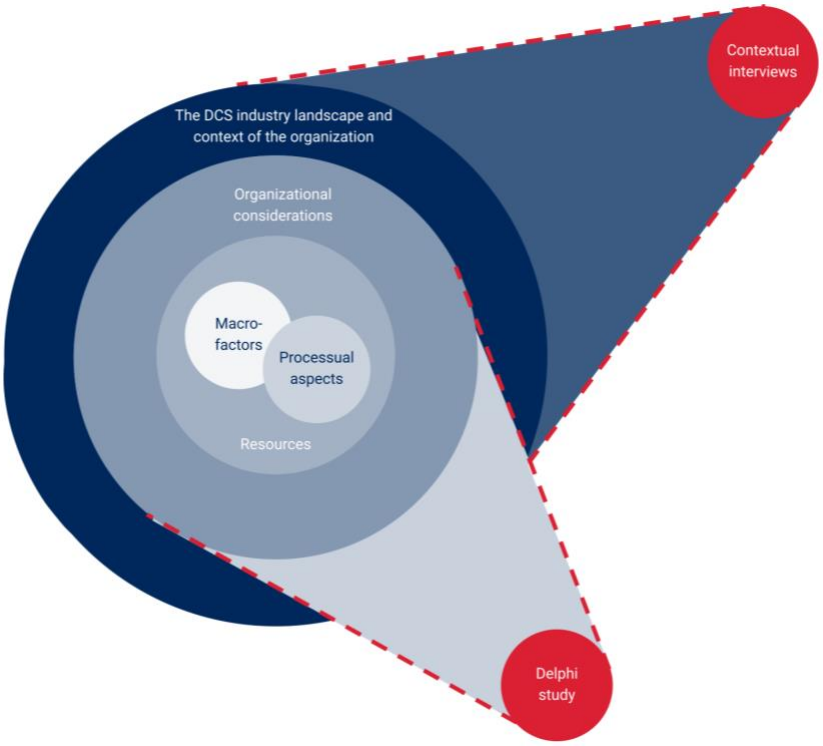

Figure 4.1. Visual representation of the analysis.

As depicted in Figure 4.1, insights from contextual interviews and the Delphi study are structured through vital building blocks that contribute to answering the research questions. The circular structure is based on the aggregate themes presented in Appendix A.3. As illustrated, all five themes are incorporated into the contextual interviews insights whereas the Delphi study insights does not include the DCS industry landscape.

4.1 Insights from the Contextual Interviews

Synthesized data from the contextual interviews will be elaborated on below, following the circular structure presented in Figure 4.1.

4.1.1 **The DCS industry landscape and context of the organization**

Saab interviewees characterize the DCS industry landscape by long PLCs and contract cycles, as well as industry research dependence, which inevitably motivates the need for long-term strategic foresight analysis. Interviewees additionally mentioned that foresight activities must incorporate dynamic changes and enable updates of the products due to the long PLCs. However, balancing new prospects while simultaneously motivating sales of developed or developing products, was expressed as a challenge.

Moreover, interviewees highlighted the complex shareholder structure as a key reason for prioritizing long-term organizational planning. Saab Group's majority owner is Investor AB with 39,7 percent of the voting rights as of 31 December 2019. In turn, the Wallenberg Family, through different foundations, possess over 50 percent of the shares and voting rights in Investor AB. In addition, they have direct ownership of Saab through Knut and Alice Wallenbergs Foundation. The Wallenberg family are long-term investors who want their investments to benefit the country, which highlights the need for a long-term perspective of the organization. However, it was stated that Sweden's priorities and low defense budget limit the organization.

4.1.2 **Organizational considerations**

The organizational considerations mainly revolved around four challenges that should be considered: shortsightedness, structural approaches, organizational inertia, as well as aligning and balancing resources between the short- and long-term analyses.

First, the demand for a more long-term analysis within Saab was expressed as an effective tool for enhancing an outside-in orientation and mitigate a silo-mindset. Such effects and a more consolidated perspective within the Group were acknowledged as results of Saab's use of a +5-20 years strategic

foresight process. Moreover, increased transparency between BAs has been achieved, which in turn has enabled increased organizational efficiency by facilitating improved knowledge sharing practices.

Second, it was discussed how the process of foresight activities should be structured. The combined view was that a top-down approach is preferred as it enables early anchoring with top management. However, it was noted that the entire organization must be involved and that the results must be communicated deeply in the organization. As a result, a purely corporate function was not preferred, since this could hinder cooperation and wide diffusion of insights. At the same time, it was noted among the various organizations that the current processes were too fragmented and needed to be further simplified and coordinated. This was also mentioned to encounter the challenge of gaining support for the results of foresight activities within the organizations. In order to achieve such support, employee engagement and trust were highlighted as important factors.

A third factor mentioned that hinders anchoring and streamlining of the foresight process is organizational inertia. It was expressed that it is not a question of whether inertia will occur, but rather when; either everyone is involved from the beginning, or everyone must be informed later. Thus, there is a balance to focus resources on dissemination early or late in the foresight process. A correlated aspect brought up was that the results from foresight activities not always are well received by employees. While this is correlated to the inertia, it could also be due to the lack of employee involvement in the process. One organization exemplified their work with transparency through something called *brutal truths*, which meant that everything needs to be addressed regardless of the situation revealed.

Lastly, it was expressed that the prioritization of activities in the near future, as well as the difficulty in balancing the resources between different time perspectives, were common issues. According to the interviewees who compared the differences between the private and public sectors, the shortsightedness is more evident for organizations in the public sector as they are not able to allocate resources to foresight activities as freely as commercial companies are. Both within Saab and other industries the financial targets and strong focus on quarterly earnings were noted as a contributing reason for short-term priority. Even though the defense is not driven by the same short-term profit interest, it was mentioned that most of the operations in the SAF are focused on the near future. On the same theme,

it was mentioned that a stronger link between short- and long-term analyses must be created by connecting the foresight analysis to the general processes within the organization. The BAs tend to have a short-term focus due to strong links to budget cycles, which may pose a challenge for both the shortsightedness and the link to the more long-term. At the same time, it demonstrates that there is a need to create a clearer link. It was also stressed that by expanding the time horizon, a distance to the present is created. Therefore, the link between the results from the long-term analysis and executive decisions weakens, which in turn creates a need for the analysis to be translated into actionable results.

4.1.3 **Resources**

Resources were discussed both regarding the composition of the foresight group as well as in terms of collaborations with external actors.

As regards the group working with strategic foresight, it was argued that it should consist of members from different areas of the organization, preferably with a majority working closely with products and customers rather than having many corporate representatives. One organization also exemplified that they had included one of their trainees in the final part of their foresight process to gain new perspectives. While it may be easier to assign responsibility for strategic foresight exclusively to line managers, it needs to be assigned to those who have time to give priority to the task.

As for external collaboration, these were in general seen as beneficial to engage in. Several of the organizations participated in external seminars and some also used consulting firms. Among those using consulting firms, it was emphasized that they were used for triangulation and support for internal analyses, rather than for full-scale foresight projects. Some Saab interviewees explicitly referred to earlier positive experiences with futurist consultants, while others were more skeptical and emphasized that if consultants are to be used, they should be involved only when initiating the process and that internal representatives must diffuse the insights in order to gain support from employees.

External collaboration with authorities or other organizations was stated as an area that needs further exploration. For Saab, collaborations with other actors in the Wallenberg family, such as Investor AB, were mentioned. The

benefits of such collaborations were the acquisition of additional knowledge and resources, improved quality of the foresight activities as well as cost-sharing. Comparatively, the SAF is working with the DCDC, the North Atlantic Treaty Organization (NATO), and is also planning to open cooperation with the European Union in terms of foresight. In addition to using partnerships as inputs to the strategic foresight process, it was mentioned that the process itself enables identification of potential partnerships.

4.1.4 **Processual aspects**

Processual aspects are divided into two areas: considerations of certain methods and more general considerations to incorporate to the overall design.

Starting with the considerations of methods, Saab and the other investigated organizations had an overarching long-term analysis based on predefined macro-factors. In some cases, it was linked to more frequent and short-term foresight activities by studying the same trends or issues over different time periods, e.g. each year, quarter, and month. Most organizations used services that automatically generate articles based on specific keywords. It was common that the foresight processes covered five years ahead, because of the companies' BP time spans and that the processes were based on previous experiences and intuition rather than on theoretical grounds. The foresight activities then served as a basis for discussion and input into the BPs. The use of scenarios was highlighted by most interviewees, who emphasized that they can facilitate creative thinking and contribute to a more open mindset. In turn, they can ease the translation of analysis into actionable results.

More specifically for Saab, there was, in general, a positive attitude towards the current strategic foresight process. However, the experiences of the current model depended on the level of involvement and the position of the interviewee. It was clear that interviewees at a higher level in the organization were more confident that such a process would be beneficial. It was also stated that the BP should be ignored to allow for disconnection to the present and that focus should be on key features, such as market movements rather than on specific products. Continuous follow-up and updates were further identified as crucial.

Shifting to more general aspects relating to the strategic foresight process, it was acknowledged that the uncertainty associated with the +20-40-year time horizon is challenging. As a result of the uncertainty, it must be acknowledged that it is impossible to dot correctly; instead, several different outcomes are preferred. Long-term analysis should guide decision-making. Rather than rushing into products and applications, the strategic foresight process should begin with an elevated view that can later be equipped with more detailed knowledge at a lower level.

Moreover, some valuable components were identified from the strategic foresight processes in the various organizations that should be considered also when designing an extrapolated framework covering a time horizon of +20-40 years. In summary, they were expressed as follows:

- Competitor analyses and market developments were, directly or indirectly, part of the process for most organizations.
- The time perspectives of the customers are limited, and it may be difficult to understand their future behavior; rather, foresight can be used to predict whether customers are prone to change.
- Strategic foresight can help to identify new potential market positions in terms of sales and production, which is important for organizations in the DCS industry as the geographical presence is complex. Thereby, strategic foresight may be used in strategic discussions with other actors.
- Strategic foresight can help to prioritize between products and solutions by providing an extended basis for decision-making.
- Analyses must be transparent and available to those affected and the intranet could be used to obtain a wide reach. There were however diverse opinions regarding to what extent the results should be disseminated.
- In terms of format, there is a need for a clear compilation and adaptation to the recipient. Some had creative inputs such as using visual communication, but others did not consider the format to be important.
- In the field of human relations, it can be useful to anticipate the need for a future workforce and make adjustments in the form of upskilling and reskilling of current employees, as well as help the organization to build partnerships with universities in important areas.

The time horizons adopted by the interviewed organizations varied from five years to 30-40 years, which in turn affected the attitudes of the interviewees

towards a time perspective of +20-40 years. It was also noted that the field of the analysis had an impact on the applicability of a longer timeframe. As an example, environmental aspects were considered relevant to study in a longer time horizon (+30 years). A longer time perspective was also identified as beneficial for organizations with long PLCs and contract cycles. Moreover, while the exact time span is less important, the real benefit of having such long-term thinking is to decouple from the present and the organizational legacy. In order to do so, those who dare to think boldly must be rewarded and protected. However, several referred to the risk of the outcome becoming indefinable and noted that it is more important to delve deeper into the current analysis or to place investments elsewhere.

4.1.5 **Macro-factors**

In terms of macro-factors, the most commonly applied aspects were political, economic, social, technological, and ecological aspects, adopted in different constellations and frameworks. An overview of these with corresponding sub-categories mentioned in the interviews, as well as the additional military factor, is presented in Table 4.1.

Table 4.1 Macro-factors from the contextual interviews.

Factor	*Sub-categories*	*Other aspects*
Technological	R&D, digitalization, space, cyber.	Considered to be important, but according to some difficult to extrapolate to a longer time horizon. Others argued that technology, more specifically R&D, can be analyzed in a longer timeframe. However, proof of concept is needed in order to achieve valuable results.
Political	Geopolitics, international relations, security policy.	Politics was identified as the main determinant of the DCS industry. Local presence is crucial in order to fully understand the political characteristics of the different regions. The behavior and movements of the organization's allies and main competitors should be considered.
Economic		Some argued that all other factors and trends derive from the economic factor, particularly the political and social aspects.
Ecological	Natural resources.	Natural resources should be included as they may cause future conflicts.
Social	Demography, competences, skills, human behavior, ethics, morals, infrastructural aspects, values.	Human behavior can be predicted in the long run. Ethics and morals tend to change over time.
Military		Emerged in interviews with Saab and the SAF, mainly in terms of strategic capabilities. Many Saab employees have a military background that often influences the organizational perspective.

More broadly, some interviewees suggested using a framework or structure for the macro-factors (e.g. the SAF uses PMESII[1] and the STA uses EPISTEL + media[2]) while others mentioned that too much focus on a framework could be disadvantageous; instead, the choice of sub-categories of macro-factors should be updated on a regular basis. In addition, disruptive events and technologies were mentioned as a challenge to address in the scanning process.

1 An acronym initially developed by the Military of the U.S. Includes the following aspects: political, military, economic, social, information and infrastructure.
2 An acronym developed with the consulting firm Kairos Future. Includes economical, market, political, information, social, technological, environmental, health and legal aspects.

4.2 Insights from the Delphi Study

4.2.1 **The first synthesis**

The synthesis presented in Table 4.2 summarizes the answers of the 24 questions in the first of two rounds in the Delphi study. The complete synthesis is found in Appendix B.4, along with the prototype framework concluded from this round that was later used in the second-round survey.

Table 4.2 A summary of the synthesis from the first round of questions.

Theme	***Synthesis***
Organizational considerations	• Foresight is important within the DCS industry. • Expected outcomes: competence building, facilitated prioritization, avoidance of myopia, a rigid planning, and decision-making structure as well as enhanced organizational coherence and shared views. • Challenges due to the long-term perspective: o Generation of actionable results o Might distract the current decision-making o Change management issues o The risk of outcomes being indefinable o To address disruptive events
Processual aspects	• Lack of consensus in what number of methods to use o Depends on selection of methods, type of organization, resources available and objective of the forecasting activities • Several combinations of methods possible, but the order is important • Interactive techniques enhance participation and help in gaining buy-in from key stakeholders • + 20-40-year timeframe is applicable • Macro-factors change at different paces • Aspects implying a methodological sequence: o Choice of method depends on scope, objective, and organization o Scanning or trend analysis should be included early o Scanning should be followed by an analysis of how trends interact o Scenarios are key, should be developed towards the end o Scenarios should be linked to the present • Presentation format is important, must be tailored to the recipient and serve as a basis for discussion
Resources	• Necessary competencies: an open mindset and creative thinking • Interdisciplinary team • External actors should be included
Macro-factors	• Technological, political, economic, environmental and social factors most frequently mentioned • Choice of macro-factors depends on the scope and objective. Only people within the organization can prioritize between macro-factors.

4.2.2 **The second synthesis**

This synthesis summarizes the answers from the ten questions of the second round in the Delphi study. The complete synthesis is found in Appendix B.5.

4.2.2.1 Organizational considerations

When asked how the results should be embedded in the organization, the respondents suggested participation of key representatives from several levels and functions but noted that the top management should initiate, be responsible for and approve the process. In addition, the results of the organizational vision should be linked to a shorter-term action plan.

As for the challenge of mitigating that the perception of the outcome is indefinable, a contingency for each scenario or event was commonly proposed. This suggests that actions, hedging-options, strategies, or policies should be predefined and ready to apply whenever a specific trend or scenario becomes more probable. Creating awareness and commitment across the organization was also emphasized, as the outcome is highly dependent on expectations. Setting the initial framework right and using the results in general strategic conversations throughout the organization, as well as to use efficient and convincing presentation formats, was further highlighted.

4.2.2.2 Resources and processual aspects

The questions in the second round of the Delphi study were designed in such a way that resources and processes were connected; therefore, they are addressed under the same heading.

Most respondents believed that the time horizon examined in this thesis is applicable; based on additional information that analyses of 0-5 and 5-20 years ahead are carried out in the organization, more than two-thirds agreed that +20-40 years is enough and applicable. Those who responded positively to the proposed time horizon argued that it depends on the organization and its strategic priorities and that it is important to engage and have a clearly defined purpose to be successful. However, those who did not consider the time horizon of +20-40 years to be relevant meant that there could be a lack of engagement from employees, or simply that +10-20 years is enough.

Regarding the proposed framework, the respondents provided their opinions on the level to be included, the methods to be used in each phase, as well as some additional aspects for each phase, which is presented in Table 4.3.

Table 4.3 Synthesis of what methods and levels to include in the foresight process.

	BA level	*Corporate level*	*External experts*	*Additional aspects*
Framing	Interviews*	Interviews**	Interviews or Delphi*	Group discussions can suffice. A summary document based on trends and industry advances can serve as a basis for discussion.
Scanning	Environmental/ horizon scanning**	Environmental/ horizon scanning*	Expert panels**	Difficult to generalize in this step as the choice of methods and level depend on context.
Understanding of linkages	Futures wheel*	Morphological analysis*	Futures wheel*	The corporate level does not have neither time nor ability to take part in this phase. If experts are included, these should be involved in all steps of the analysis, not only in this phase.
Scenario building	Workshops**	Exploratory scenarios**	Exploratory scenarios, workshops**	External experts can provide additional perspectives when reviewing the results. Beneficial to include the corporate level in this phase to gain immediate ownership and acceptance of results.
Output/ synthesis	Workshops**	Road mapping, visioning**	Workshops*	

** recommended by the majority, ** recommended by all*

Responses of how often each phase should be conducted were widespread and ranged from every few months to every ten years. In general, the answers included a more long-term view that should be supplemented with a rolling three-year update within which more frequent minor updates should be undertaken based on continuous course-checking activities. The scanning phase was expressed as particularly beneficial for continuous assessment. It was also noted that disruptive events may trigger a need for a complete long-term analysis within a shorter timeframe.

4.2.2.3 Macro-factors

In the second round of the study, macro-factors were not addressed.

5 The Conceptual Framework

This chapter presents the final conceptual framework developed on the basis of the data analysis. The five phases of the prototype framework, which emerged from the Delphi study, were elaborated on by adding further theoretical and practical insights. This resulted in a framework of six phases, namely: Framing, Scanning, Understanding of linkages, Projections, Implications, and Communication. Each phase, their corresponding methods, and suggested execution process will be elaborated in this chapter.

The conceptual framework, presented in Figure 5.1, was developed based on the literature review, the Delphi study, and the contextual interviews. In comparison to the prototype framework presented in Appendix B.4, the former output/synthesis phase has been divided into two separate phases: implications and communications, in order to highlight the importance of thorough dissemination (Becker, 2002; Hayward, 2004; UNDP, 2015; Voros, 2017; Wilkinson & Kupers, 2014). Moreover, in addition to the three organizational levels presented in the prototype framework, a *Foresight Group* (FG) is suggested to be responsible for the initiation, steering, and completion of the foresight process. The composition of this group is elaborated in section 5.1.

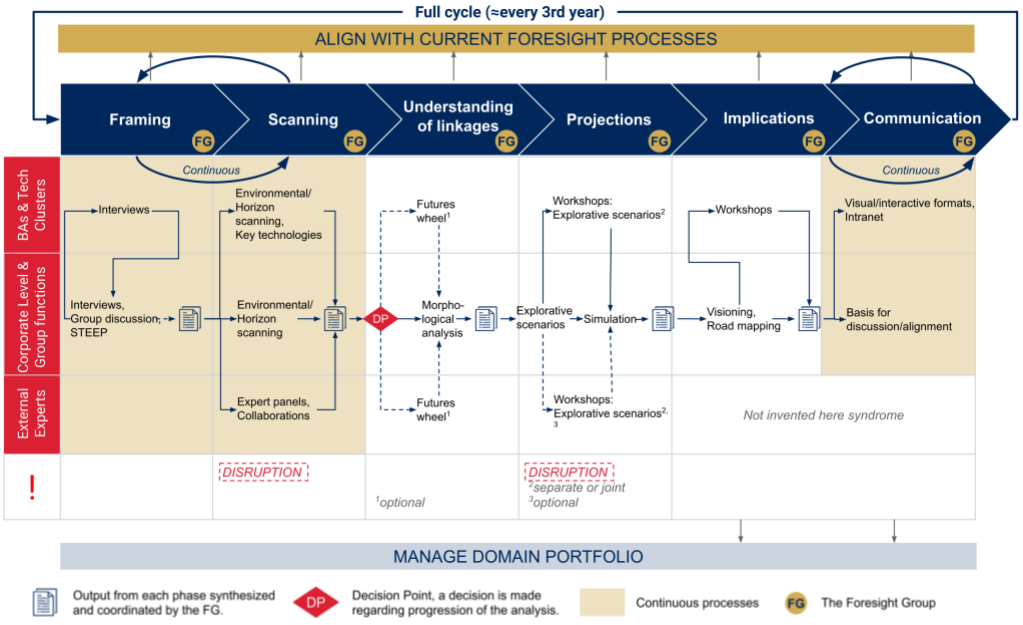

Figure 5.1 The final conceptual framework for strategic foresight in the time perspective of +20-40 years.

The selection of methods has been made to ensure a wide variety. It has also been based upon the method's fit with its preceding and succeeding methods, as well as its possibility of contradicting other methods in the framework. These considerations were made in order to achieve triangulation (Aaltonen & Sanders, 2006; GO-Science, 2017; Magruk, 2011; Popper, 2008; Vecchiato & Roveda, 2010).

The periodicity is highly dependent on the organization's available resources. Depending on what is detected in the framing and scanning phase, the rest of the process is suggested to be carried out more seldomly. Therefore, the transition into the understanding of linkages phase is gated by a decision point (DP); a mechanism that helps in the monitoring and tracking of long-term trends. The suggested frequency of carrying out the process every three years is a result of a combination of the mean value from the respondents in the Delphi study, and a specific recommendation to the case organization. Moreover, the communication phase is also suggested to be carried out on a regular basis to ensure that the organization is constantly reminded of the existence of the long-term foresight process. As illustrated in Figure 5.1, phases conducted continuously are indicated by a beige background.

To enable output from this long-term process to act as input to more short-term processes, continuous alignment within the organization is suggested, as visualized through the arrows connecting each phase with the bar named *align with current foresight process*. The bar illustrated in the lower part of Figure 5.1 The final conceptual framework for strategic foresight in the time perspective of +20-40 years., *manage domain portfolio*, highlights the purpose of finding indications regarding what domain(s) (i.e. land, air, sea, cyber, and space in the case of the DCS industry) that will be critical and the importance of keeping the analysis abstract on a high level, rather than to conclude what exact products there is a need for +20-40 years ahead. Such indications appear in the implications phase and are disseminated into the organization in the communication phase, regardless if the findings are favorable or not.

In the sections Phase 1: Framing-5.7, each phase of the Final Conceptual Framework will be further elaborated. Nonetheless, for a detailed description of foresight methods, the authors refer to Glenn and Gordon (2009), Popper (2008), and Porter (2004). Moreover, GO-Science (2017) provides a practical application of their futures toolkit in the context of the UK Government.

5.1 The Foresight Group

The FG is proposed to consist of an interdisciplinary mix of individuals mainly at the corporate level, preferably including those responsible for the development of strategies in order to ensure effective transfer of knowledge and action. It is suggested to also include people possessing clear insights into the BA's in the FG, in order to understand and incorporate the viewpoint of individuals at all levels in the organization. These individuals should then be accountable for directing and disseminating activities into the BA's, which will enhance the interdisciplinary aspect of the team and favor a transparent process.

Moreover, the FG must gain expertise in the use of various foresight methods and techniques, either by training or through external actors who provide methodological support. It is further critical that the group have analytical skills, an open mindset and can differentiate between issues of major and

minor significance. The team should also be aware of the importance of engaging objective expertise to test their viewpoints.

The core of this group is suggested to remain the same throughout the process, to which extent it is possible, and are responsible for the coordination and output at each phase. It is beneficial if this group also is responsible for, or involved in, the more short-term foresight processes within the organization to provide further coherency with the existing foresight processes. Depending on the time and budget available in a specific organization, the group may either have full-time responsibility or function as a temporary task force. However, it is paramount that the individuals involved are given enough time to conduct the tasks.

5.2 Phase 1: Framing

The process begins with a top-down approach in the framing phase, where the FG is responsible for defining the scope, rationale, and objectives of the process through *group discussions* conducted by the FG together with corporate level representatives. Initially, this also includes evaluation of the FG and a decision upon if other individuals within the organization should be added. One of the main considerations at this stage is the decision of what macro-factors to consider, as this lays the foundations for the process. Hence, the framework *STEEP* is suggested with the possibility to add or remove other macro-factors. In addition, the chosen factors should be aligned with those investigated in the more short-term foresight process in order to efficiently link the long- and short-term foresight processes. As the timeframe spans 20 years and the macro-factors are changing at various paces, they should be analyzed in various, corresponding time horizons.

Input from individuals at different levels is crucial, why incorporation of the BA/Tech cluster level in particular, but also the corporate level group functions, is suggested. These Tech clusters are platforms creating an intersection between different BAs through knowledge sharing across BA boundaries. *Interviews* are suggested to ensure early anchoring and mitigate inertia as the entire organization will be affected by the results. Such an approach also facilitates continuous updates of factors to include, as this phase should be conducted on a regular basis. Results and inputs from the *interviews* are then incorporated into the discussion of the FG and compiled

into a framing document including a project plan with defined tasks, milestones, deliverables, and deadlines, as indicated in Figure 5.1. This also applies to the rest of the activities in the framing phase: scoping, setting the objective, and choosing stakeholders to include.

External input was neither recommended in the Delphi study for this phase nor is it suggested here as the decision on what factors to include should be made only by individuals within the organization.

5.3 Phase 2: Scanning

The second phase, scanning, includes all three suggested levels. *Environmental/horizon scanning* is recommended on the corporate and BA level/Tech clusters. The technology-factor should be emphasized; why *key technologies* are highlighted as a specific issue to be monitored. Except for drivers and trends within these areas, attention should also be paid to *disruption*, i.e. wild cards, black swans, weak signals, and discontinuities, which mitigates narrow-minded and myopic tendencies. In order to add another dimension to the analyses, it is suggested that the FG include levels of regionality, ideally by scanning trends in the most important regions of the focal organization. The regional approach is also suggested to include how rivals and partners may be influenced. Moreover, by including *expert panels*, which are common in the study of long-term trends, new perspectives with a high level of trustworthiness could be brought to the organization and further collaborations could be achieved.

Furthermore, it is suggested that the framing and the scanning phase are continuously iterated. For each iteration, a decision of whether to continue the process or not is taken in the DP, depending on the significance of the findings. Regardless, the results should be communicated and aligned with the more short-term foresight process.

5.4 Phase 3: Understanding of Linkages

In the third phase, understanding of linkages, all three levels can be included, but the responsibility primarily lies on the FG group. The *futures wheel*[3] is powerful in engaging people, yet also a simple method, why the *morphological analysis*[4] is considered to be more fruitful due to its inherent complexity. Therefore, the method recommended for BA/Tech clusters and external experts, *the futures wheel*, is optional.

That said, FG representatives from all levels may still be involved in the *morphological analysis*, which could consider eventual syntheses from the use of the futures wheel as input to include perspectives of BA level and/or external experts.

5.5 Phase 4: Projections

In the fourth phase, projections, *explorative scenarios*[5] are suggested to be performed at all levels. Initially, it should be assured that there is enough variety of knowledge within the FG to construct high-level explorative scenarios describing possible futures. If not, the FG should be complemented with internal knowledge and experience. Moreover, like the scanning phase, *disruptions* should also be considered in order to examine all possible outcomes. In order to equip the high-level scenarios with further detail and to gain immediate ownership and acceptance of results, they should be further elaborated through *workshops* on the BA level. Workshops with external experts could further be conducted to receive additional perspectives, either together with the BAs or separately. However, these are considered optional depending on the level of confidentiality.

After the involvement of all levels in the scenario-process, the FG group compile the results into a few possible future scenarios. The more participants engaged in the scenario-process; the more synergies may be created. Although certain scenario aspects can be unique to a concept or

3 For reference, see Gordon & Glenn (2009)
4 For reference, see Popper (2008) and Stenström (2011)
5 For reference, see Wilkinson & Kupers (2014)

mission, most scenario components can be shared between various organizational units. The results from this phase are not one single scenario but several, as foresight in contrast to traditional forecasting will not predict one future. Instead, the output will be an eyeopener and a basis for discussion.

In practice, however, the central question of how to implement foresight processes remains. Therefore, *simulations* are suggested to test the results and build traction to support the realization of key strategic objectives by challenging the mental models in the organization. In doing so, the likelihood of stakeholders accepting novel ideas is increased. By integrating simulations, such as business wargaming, into the foresight process the formulation and testing of a potential reaction strategy can in turn be realized. Hence, it is easier to understand how expectations or preferences may change in different contexts and to identify weak signals in order to explore action-reaction sequences.

5.6 Phase 5: Implications

External experts are exempt from involvement in the implications phase in order to prevent the incidence of the non-invented-here syndrome. On the corporate level, *visioning*[6] is done first by taking outset from the possible scenarios in the previous phase and choosing one of these as the organization's most preferable future. To enable the preferable future to guide current decisions and mobilize collaborative efforts, *road mapping*[7] is suggested to follow, which enables the creation of a timeline for the development of various interrelated aspects.

Furthermore, like visioning, *workshops* facilitate a more deeply rooted foresight process and is an appropriate tool to achieve the goal of widening expectations available to the recipients of the foresight work. Thus, easing a better anchoring of the results also on the BA level for the next phase: communication.

6 For reference, see Glenn and Gordon (2009)
7 For reference, see Popper (2008)

5.7 Phase 6: Communication

The sixth and last step considers communication of the results from the foresight process. Dissemination is important in order to increase the probability of actionable outcomes, the integration of individuals and their viewpoints into the process. Moreover, as it was apparent in the contextual interviews that dissemination is further called for, the significance of this phase is stressed. It was also expressed that inertia eventually will occur. Through this step, the resources put on dissemination is balanced to complement the communication in the preceding phases and consistency with the current foresight process.

The information must further be tailored to the recipient. Visual or interactive formats are proposed to achieve wide dissemination on the BA level. From the experiences of other organizations, the intranet may also serve as a facilitator of this. As regards the corporate level, the output should serve as a basis for discussion internally, but also with external actors. Again, external experts are exempt to avoid the not-invented-here syndrome, as well as to ensure that confidentiality, which inevitably emerges in the defense context, is fulfilled.

6 Discussion

This chapter provides a summary and interpretation of the most significant findings of this thesis as well as their implications. Limitations of the study and suggestions for further research are also provided. Lastly, the chapter presents a conclusion of the thesis.

6.1 Summary of Significant Findings of the Study

The results of this thesis indicate that, above all, the following are of particular importance in relation to the first research question, i.e. in identifying and selecting macro-factors for foresight activities in the time horizon of +20-40 years within the DSC industry:

- *Input to the rest of the process*
  The selection of macro-factors should be the first step in a foresight process as it sets the frame for the scanning activities. It is further beneficial to use a framework of macro-factors to build on and to align the chosen factors with those investigated in the more short-term foresight process. In this thesis, STEEP was suggested with the opportunity to dynamically add, remove or adjust factors between each iteration. This suggestion enables bottom-up communication, the possibility to add further details (Cuhls et al., 2015) and mitigates the risk of being hampered by the boundaries of the frameworks.
- *Variations in the investigated time horizon*
  It was also found that macro-factors change at various paces, why they should be examined in various time perspectives corresponding to these changes.
- *Framing should be made internally*
  Moreover, it was found that the choice of macro-factors can only be made by individuals within the focal organization and that it is important to involve people from various levels in the organization to achieve a holistic scanning.

As regards the second research question, i.e. the selection and combination of components and methods for foresight activities in the time horizon +20-40 years, Figure 5.1 provides a summary of the main findings. Furthermore, the following results are of particular importance to the composition of the framework:

- *Influences from a long-term horizon*
  To be able to conduct a long-term strategic foresight project, it is essential that there already exist processes for conducting foresight in a shorter time horizon, as this will allow the outcome of a long-term project to be converted into actionable results. Thus, it helps to disturb the business-as-usual view that tends to result from wishful thinking or the linear extrapolation of current trends. It is also encouraged to align long-term results with more short-term foresight processes frequently.
- *Incorporating long-term analysis into the organization*
  Moreover, for the results to be embedded in the corporation, all organizational levels should be included. Thereby, information exchange between people in various areas of the organization is promoted and silo thinking can be mitigated. This further allows the top-down approach of the strategic foresight process to be complemented with a bottom-up perspective.
- *Varying needs of periodicity*
  The framing and scanning phases are gated by a DP in order to generate continuous updates of the surroundings in a long-term perspective, whilst preventing that a complete long-term study is conducted by routine, rather than when there is a real need for such an analysis. Moreover, while it is suggested to conduct the complete long-term analysis on a regular basis, the exact periodicity could not be concluded in this thesis. Instead, it has been emphasized that the periodicity depends on the unique needs and resources available for the focal organization. In addition, as argued for by Wilkinson and Kupers (2013), it is beneficial to allow strategic foresight activities to follow a pace distinct from the annual strategic cycle since this enables organizations to see realities that would otherwise be ignored and make leaders comfortable with the uncertainty of an open future. Nonetheless, the DP enables disruptive events to trigger a complete cycle to be conducted more frequently than the identified organization-specific periodicity.

6.2 Interpretation of the Significant Findings

Comparing these results with the previous findings in the field of strategic foresight, we discovered not only similarities but also some significant differences.

Starting with the similarities, the typological division of the foresight process in this thesis relates to those in previous findings (Bishop & Hines, 2012; Durst et al., 2015; Gordon & Glenn, 2009; GO-Science, 2017; Goux-Baudiment, 2016; Saritas, 2006; Schulz-Montag et al., 2010; Slaughter, 1997; Voros, 2003). It has been adopted as a result of the processual implications from the Delphi study, as well as to facilitate alignment with the current strategic foresight process adopted by the case organization. This way of dividing the process also enables the various phases to be conducted with different periodicity in accordance with the reasoning of Andersen and Rasmussen (2012).

Moreover, in line with extant research (Hines & Bishop, 2006; Jørgensen et al., 2002; Magruk, 2015; Popper, 2008; Rohrbeck et al., 2015; Vecchiato & Roveda, 2010), we have experienced contradicting and ambiguous use of definitions and methodological guidelines by the participating foresight experts in the Delphi study. It has also been found that the lack of formal processes and procedures for strategic foresight described in the literature (Becker 2002; Magruk 2015; Raban & Hauptmann, 2016), also was inherent in the organizations that have been objects of investigation in this thesis. Conformity was further found between the investigated organizations and the fragmented processes found in extant literature (Becker, 2002; Beşer & Öner, 2011). In addition, the Delphi study showed that the results of the organizational vision should be linked to a shorter-term action plan. This is also argued for by Becker (2002), as well as Miles and Keenan (2002) who state that foresight processes should essentially guide current decisions and mobilize collaborative efforts.

To facilitate the implementation of the conceptual framework, the FG group was introduced. An interdisciplinary team has been suggested as Wilkinson and Kupers (2014) argue that the diversity and quality of a foresight team is key to its success. It has further been emphasized that it should have a different profile from much of the rest of the organization and act as a peace-disturber that can test profoundly held assumptions. Moreover, as argued for

by Wilkinson and Kupers (2014), the team members must feel as free as possible from departmental politics and be allowed to challenge. Making the group interest-based, with voluntary participation rather than forcing the group together, helps mitigate the silo phenomenon existing in many large organizations, in line with the reasoning of Forsten-Astikainen et al. (2017) and du Plessis (2008). Moreover, by allowing this group to be centralized, it is probable that disagreement about Group strategy can more easily be resolved and that the business-as-usual view that appears to arise from wishful thinking or linear extrapolation of current trends can be disturbed, in line with Wilkinson and Kupers (2013).

In addition, supplementing the core team with insightful individuals from outside the company has also been suggested to provide flexibility and depth. External experts have been included in the framework as a result of the highlighted importance of improved external cooperation between foresight exercises found both in the contextual interviews, as well as in the reasonings of Becker (2002), Janowicz-Panjaitan and Noorderhaven (2009), and Rohrbeck et al. (2015). The inclusion of experts is not only a source of excellence but also a time-efficient approach, as it minimizes double work and provides guidance for further in-house scanning activities. External experts are also suggested when in need of methodological support. However, they should never take full responsibility for either scenario or strategy development.

As regards the research in the area of corporate foresight, the findings in this thesis contribute to the extant literature by illustrating a conceptual framework for strategic foresight in the context of the case organization, despite its limitations on confidentiality, rather than providing generic recommendations of a framework.

Shifting the focus to differences, it has been found that while it is important to use a structured approach towards the choice of macro-factors that allows for modification (e.g. Durst et al., 2015; Goux-Baudiment, 2016; Jonsson & Sonnsjö, 2010; Popper et al., 2007; UNDP, 2018), having an approach that allows for continuous updates of the assortment of factors and adjustment in each iteration, will mitigate the risk of keeping to well-trodden paths yet more. In turn, the risk of being blindsided by disruptions is also reduced as the DP enables a mechanism to monitor and track long-term futures through a more dynamic rhythm. By not only focusing on regularized cycles it is also

possible to invigorate the plausible futures depending on the signals of change that are scanned for.

In addition, this thesis has incorporated aspects of implementation that are important for the design and development of the framework, and that emerged in the creation of the framework. This addresses the complexity of combining methods found in existing literature (Becker, 2002; Bishop & Hines, 2012; Magruk, 2015; Raban & Hauptmann, 2016) and advances the understanding of how methods should be selected.

Finally, this thesis contributes to the area of strategic foresight by adding a demonstration of how a conceptual framework can be designed to fit the time perspective of +20-40 years, while extant literature mainly has focused on the time perspective of +10-20 years (Becker, 2002; Gasinska & Eriksson, 2018; Popper, 2008). As regards the framework, there is nothing that limits an adoption into a shorter timeframe; however, it should be noted that other methods may be more suitable in another time horizon. For a longer timeframe, it may also be possible to some extent, but when reaching too far into the future, it might be difficult or impossible to find fact-based information as input to the scanning phase.

6.3 Implications of the Study

Three main implications of this thesis have been identified. First, the transferability of the results will be discussed. As Johannesson and Perjons (2014) argue, a case study research strategy does limit the transferability of the results. However, we will in this section argue that we believe that some of the findings nonetheless could be applicable given that the following conditions are fulfilled:

- The purpose of the foresight activities aligns with the purpose set for the conceptual framework in this thesis and the need for a long-term orientation is rooted in the specific characteristics of the organization's business operations.
- There are foresight processes with a shorter time horizon in place in the organization.
- The three dimensions of strategic foresight methods presented by Vecchiato and Roveda (2010), i.e. the time horizon, field, and scope

are the same, see Figure 3.2. This implies that the organization operates in an industry with similar characteristics.

If, and only if, these conditions are met, the high-level structure of the framework – the six different phases, the inclusion of external experts, corporate and business area level representatives and the translation of results to domains rather than products – can be transferred into the context of another organization than the case organization with a need for long-term foresight. It should further be noted that the agile use of the STEEP framework suggested in the framing phase can be transferred, as it is holistic and allows for adaption by the specific organization through various subcategories. Depending on organization, other elements may also be transferable.

Second, the results have implied that there are some important aspects to consider when implementing a strategic foresight process. For example, there may be contradicting attitudes towards conducting long-term foresight analyses, which in turn induce organizational inertia. Existing silo thinking which is common for large corporations (Forsten-Astikainen et al., 2017), may also prevent the results from being rooted in a corporation as the flow of knowledge between people in different areas is limited. In turn, this implies a need for thorough dissemination, improved collaboration areas, and an approach that facilitates the implementation of organizational changes in accordance with the results of the analysis.

Last, both theoretical and practical insights implied that external collaboration in foresight processes should be further investigated; organizations should seek to develop such collaborations both within their own industry as well as with organizations in other industries. By doing so, organizations can catalyze their foresight process(es), spur knowledge sharing and enhance the result from their foresight process(es) (e.g. Becker, 2002; Boudreau et al., 2016; Cappelli et al., 2014; Henttonen et al., 2011; Weigand et al., 2014). Moreover, collaborations with industry, but also academia, are favorable not only in terms of gaining knowledge but also in terms of positioning the company towards other actors and potential future employees. However, confidentiality is an intrinsic issue for external knowledge sharing, why the subject of discussion, foras, and actors for external collaborations must be well-considered.

6.4 Limitations and Suggested Further Research

This thesis suffers from some limitations which have affected the transferability of the study as well as the data collection process. First, the case organization has not yet made many iterations of their current strategic foresight process, reaching up to 20 years. This is problematic as it is suggested that the conceptual long-term analysis should be aligned with the more short-term analyses, while the latter projects may change in time for the implementation of the former. While this is unique to the case organization, future potential adjustments due to identified problems in the current structure may also need to be extended to the design of the long-term process as well. The number and assortment of investigated organizations in the thesis further limit the possibility to generalize. While the number was identified to be enough given the time and resources available in the scope of a master's thesis, a larger number and a more robust selection of organizations to analyze and compare with would be desirable. In particular Shell, which the authors repeatedly tried to contact, as a result of their profound work in the area of long-term scenario planning. As regards the data collection process, the omission of responses between the two rounds of questions may have created a skewness of the results.

Second, there are limitations in the framework originating from not reaching any consensus on what periodicity to conduct the long-term foresight process, why there is a need for further analysis of this. Such research could revolve around whether there is a minimum and/or a maximum limit in how often the complete long-term strategic foresight cycle should be carried out. However, as we have argued, this decision is dependent on the organization's scope and resources, why further research also could be aimed at a more in-depth review of key factors influencing this decision.

A third limiting aspect of this thesis is that the entire implementation aspect of the conceptual framework has not been considered. It has, however, been identified as an important aspect to investigate since the results of long-term analyses may be difficult for individuals and areas of an organization to grasp and put in relation to their business-as-usual view. This calls for further investigation on approaches to adopt in order to prepare and facilitate for individuals and areas in the organization in making organizational changes, i.e. facilitating how the organization understands, embraces and commits itself to the intended conceptual framework, as well as transfers the results

into the different parts of the organization. We therefore also call for practical applications the framework in other organizations in order to test its validity. In addition, we encourage further research on the implementation of an activity that enables participants to assess and evaluate elements of the process. As Nugroho and Saritas (2009) argues, this can provide a forum for participants to express and share their views on what worked versus what did not. In turn, such an activity could contribute to further developments of the long-term strategic foresight and improvements of other related activities within the organization, such as the more short-term foresight process.

Finally, in order to facilitate the different elements of the long-term strategic foresight process as well as its alignment with the more short-term processes, it would be of interest to explore the possibilities of creating a foresight support system. The German Federal Armed Forces have for example designed such a system in the form of a digital platform (Durst et al., 2015). Another example of a digital foresight planning system, suggested by an expert in the Delphi study, is EIDOS: a computer-based system that makes it possible to follow the progression of key drivers, monitor scenarios over time, and ensure the connection of scenarios and strategy. Thereby, collaborative efforts can be facilitated, which enables the creation of more coherency and transparency within the organization. Such a system could also enable the reuse of results from previous foresight analyses, as every foresight project, for instance, generates data like trends, factors, risks, and scenarios. (Durst et al., 2015). Using support systems developed by external actors may, however, be problematic for actors in industries characterized by critical security restrictions, such as the DCS industry.

6.5 Conclusion

The main purpose of this thesis has been to establish a conceptual framework for strategic foresight activities within a technology-intensive organization that requires long-term (+20-40 years) strategic foresight. The result describes such a conceptual framework, divided into six phases with a focus on involving several levels and perspectives, both internal and external. It stems from interviews in the context of the case organization Saab as well as from a Delphi study with foresight experts as complements to the theoretical findings in extant literature.

An overarching goal of this thesis has further been aimed at providing a tool that allows for a broader, more conceptual link between plausible futures and the organizational strategy making. More specifically, it has been investigated how activities can be composed methodologically to suit an organization with a need for long-term foresight, as existing methodological compositions cannot simply be reused for other areas of application. Thus, this thesis has illustrated one example of foresight practice. However, more is needed in order to expand the knowledge base in the area of strategic foresight as well as to promote foresight within organizations. By doing so, new theoretical grounds can be instilled with new insights and understandings. Open dissemination of information on how the own organization operates in the field of strategic foresight, without necessarily sharing the derived insights, contributes to a more efficient knowledge flow. In addition, by also being open to foresight practices of others, even if they are outside the perceived area of the own organization, synergies can be created. It is our hope that this thesis will spur and inspire such an open knowledge flow in the area of strategic foresight.

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Appendix A Contextual Interviews

This appendix presents the interviewees participating in the contextual interviews, the three different interview guides that were used and the synthesized data structure.

A.1 Interviewees

Table A.1 Position and department of interviewees.

Interviewees within the organization			
Position	***Department***	***Date and length of interview***	***Forum***
Head of Incident Response and Threat Intelligence	Cyber, Combitech	26 Feb 2020 (60 min)	Telephone
CTO	Group Strategy	27 Feb 2020 (50 min)	Telephone
Professor, Computer Science	Board Member	2 Mar 2020 (45 min)	Telephone
Director	Public Affairs	3 Mar 2020 (60 min)	Saab's office, Stockholm
Head of Business Development and Strategy	Surveillance	3 Mar 2020 (40 min)	Telephone
Space Advisor	Group Strategy	3 Mar 2020 (40 min)	Saab's office, Stockholm
Vice President	Public Affairs	4 Mar 2020 (90 min)	Saab's office, Stockholm
Head of Saab Academy	Human Resources	4 Mar 2020 (50 min)	Saab's office, Stockholm
Global Strategic Workforce Planning Lead	Human Resources	4 Mar 2020 (55 min)	Saab's office, Stockholm

Senior Advisor on International and Government Affairs	Board Member	6 Mar 2020 (75 min)	Interviewee's office, Stockholm
CTO	Aeronautics	9 Mar 2020 (60 min)	Telephone
Former Supreme Commander of the SAF	Board Member	6 Mar 2020 (70 min)	Interviewee's office, Stockholm
CSO	Group Strategy	30 Mar 2020 (70 min)	Telephone
Interviewees from the area of defense			
University Director and (former Head of Long-term Planning Branch)	The Swedish Defense University (SAF)	4 Mar 2020 (55 min)	Interviewee's office, Stockholm
Head of Long-term Planning Branch	SAF	10 Mar 2020 (40 min)	Interviewee's office, Stockholm
Professor in the Areas of War Studies/Strategic Studies	The Swedish Defense University	18 Mar 2020 (40 min)	Telephone
Interviewees from other industries with similar characteristics			
Strategist	Swedish Transport Administration, Infrastructure	11 Mar 2020 (40 min)	Telephone
Senior Vice President, Strategy and Analysis	Preem AB, Oil and Gas	18 Mar 2020 (70 min)	Telephone
Production Manager	E.ON, Energy	24 Mar 2020 (40 min)	Telephone
Leading the Sustainability Affairs at Husqvarna Group	Husqvarna Group, Consumer & Industrial Durables	24 Apr 2020 (40 min)	Telephone

A.2 Interview Guides

Prior to the interviews, the respondents were given a brief introduction to the thesis and the objectives of the study. Moreover, they were given the opportunity to either approve or decline the use of audio recording of the interview, as well as the publication of their answers. This was also either confirmed or rejected when the interviewees initially confirmed their participation. Even though the same set of questions has been used for each group, they have been slightly adjusted in individual cases depending on the respondent's position and prior knowledge. Table A.2 presents the interview guide for individuals within the case organization, Table A.3 for individuals within the area of defense and Table A.4 for individuals from other industries with similar characteristics.

Table A.2 The interviews guide used for the contextual interviews with individuals within the case organization.

Number	***Question***	***Comments***
1	***Introduction and context***	
1.1	What is your role within Saab?	Position, Business Area, tasks and responsibilities.
1.2	For how long have you been working at Saab?	Within the company, as well as this specific position.
1.3	What do you associate with the term strategic foresight?	If unfamiliar: discuss the terms of long-term planning, future orientation.
1.4	What are your thoughts on the need for strategic foresight at Saab?	Follow-up: why? Is the need for foresight increasing or decreasing? Why? In what areas?
1.5	Which benefit do you expect from foresight activities?	Examples: (1) reduction of uncertainty, (2) warning on discontinuities, (3) influencing the future.
2	***The Current approach to strategic foresight***	
2.1	How, or in what way, is your position related to the strategic foresight at Saab?	To what extent are you involved in the environmental scanning process?
2.2	How do you perceive the structure for strategic foresight at Saab as-is?	Both regarding *Business Plan (0-5 years)* and more long-term strategic foresight *(5-20 years).*

2.3	How would you assess the process in terms of time and resources?	Follow-up: why?
2.4	Do you perceive that the responsibility for strategic foresight clearly assigned?	Follow-up: why?
3	***Value contribution***	
3.1	How do you use/plan to use the results from the more long-term strategic foresight (5-20 years) process in your Group Function/Business Area?	Please describe the process of a typical foresight activity, if possible: ask to provide a concrete example.
3.2	Do you see any improvements since the introduction of the more long-term strategic foresight *(5-20 years)* process?	If unable to answer: provide examples of improvements in terms of time, accuracy, resource utilization, etc.
3.3	What are the biggest challenges with the more long-term strategic foresight *(5-20 years)* process today?	
3.4	Have you identified any areas of improvement of the components or methods of the more long-term strategic foresight *(5-20 years)* so far?	If unable to answer: provide examples, e.g. strategic context, market, OA, etc.
3.5	What macro-factors do you believe are relevant to strategic foresight?	E.g. P, E, S, T, or other aspects that the interviewee believes to be relevant. Follow-up: does the interviewee believe any aspect to be more important than others?
4	***Time aspects***	
4.1	What time-horizons do you believe are necessary within strategic foresight for Saab?	Follow-up: benefits, challenges, why?
4.2	What macro-factors do you believe are most important and possible to analyze in this horizon?	If unable to answer: discuss current elements i.e. P, E, S, T.
4.3	Do you consider that there are sufficient expertise within Saab to conduct this type of analysis today?	
4.4	What is your experience on what time horizon your customers use in their strategic foresight?	

4.5	How are, or how do you perceive that, the insights diffused within your company and to you?	Formal vs. informal, (2) rapidly vs. slowly, or (3) not at all.
5	***Opinions on the perspective of planning horizon of +20-40 years (if this time horizon differs from the respondent's answer in question 4.5.)***	
5.1	What do you think of foresight in a time horizon of +20-40 years?	Follow-up: benefits, challenges, why? If unable to answer: due to customers, PLC, etc.
5.2	What macro-factors would be beneficial to analyze in this time perspective?	If unable to answer: discuss elements e.g. P, E, S, T.
5.3	Do you believe it would be possible to use the same model as for the current more long-term strategic foresight *(5-20 years)* in this time perspective?	Follow-up: to what degree, e.g. specific components.
5.4	How would you prefer that the results from such an analysis were presented in terms of format?	
6	***Additional aspects***	
6.1	Is there anything you would like to add that we have not asked you?	

Table A.3 The interviews guide used for the contextual interviews with individuals within the area of defense.

Number	*Question*	*Comments*
1	***Introduction and context***	
1.1	Can you describe your position within the *[the organization of the interviewee]*?	Position, tasks, and responsibilities.
1.2	What do you associate with the term strategic foresight?	If unfamiliar: discuss the terms of long-term planning, future orientation.
1.3	What are your thoughts on the need for strategic foresight in the defense industry/area?	Follow-up: why? Is the need for foresight increasing or decreasing? Why? In what areas?
1.4	Which benefit do you expect from foresight activities?	Examples: (1) reduction of uncertainty, (2) warning on discontinuities, (3) influencing the future.

2	***The current approach to strategic foresight***	
2.1	What are your experiences of and involvement in strategic foresight within the defense industry/area?	
2.2	Can you describe the current approach for strategic foresight within *[the organization of the interviewee]*?	Time perspective, level of involvement at the Swedish Armed Forces
2.3	What time horizon is used in foresight activities at the Swedish Armed Forces?	Follow-up: why?
2.4	How do you perceive the approach for strategic foresight within *[the organization of the interviewee]* as-is?	Is there room for improvement?
2.5	Which benefits have foresight activities created within *[the organization of the interviewee]*?	Please name concrete examples
2.6	Do you measure the success of foresight activities?	
2.7	How is the responsibility for foresight activities assigned within *[the organization of the interviewee]*?	E.g. specific department for foresight, decision-making at the corporate level, or consultants, several teams, etc. Follow-up: why?
2.8	What competencies and experiences do the team responsible for foresight activities have?	
3	***Information gathering***	
3.1	What information sources are used at the Swedish Armed Forces in order to anticipate and monitor future developments?	Examples include: (1) internal, external, (2) formal vs. informal, (3) restricted sources that yield a competitive advantage vs. easily accessible sources
3.2	Which methods do you use to gather, assess and disseminate future related information?	Are both qualitative and quantitative methods used, how many, in what combination, etc.
3.3	How are foresight methods selected at the Swedish Armed Forces?	Are they chosen regarding (1) aim of foresight exercise, (2) context of the company
3.4	How are the insights generated from foresight activities diffused within the organization?	E.g. (1) internal or external, (2) formal or informal.

4	***Value contribution***	
4.1	How are results from the long-term strategic foresight process used at *[the organization of the interviewee]*?	Please describe the process of a typical foresight activity, if possible: ask to provide a concrete example.
4.2	What are the biggest challenges with a more long-term strategic foresight process today?	
4.3	What macro-factors do you believe are relevant to long term strategic foresight?	E.g. PEST, STEEP or other aspects that the interviewee believes to be relevant. Follow-up: does the interviewee believe any aspect to be more important than others?
5	***Time aspects***	
5.1	What time-horizons do you believe are necessary for strategic foresight in the defense industry/area?	Follow-up: benefits, challenges, why?
5.2	What macro-factors do you believe are most important and possible to analyze in this horizon?	If unable to answer: discuss current elements i.e. PEST.
6	***Opinions on the perspective of planning horizon of +20-40 years (if this time horizon differs from the respondent's answer in question 4.5.)***	
6.1	What do you think of foresight in a time horizon of +20-40 years?	Follow-up: benefits, challenges, why? If unable to answer: due to customers, PLC, etc.
6.2	What macro-factors would be beneficial to analyze in this time perspective?	If unable to answer: discuss elements e.g. PEST.
6.3	What methods would be beneficial to use in order to perform analyses in this time perspective?	If unable to answer, provide examples: forecast, horizon scanning, workshops, war-gaming, etc.
7	***Additional aspects***	
7.1	Is there anything you would like to add that we have not asked you?	

Table A.4 The interviews guide used for contextual interviews with individuals from other industries with similar characteristics.

Number	*Question*	*Comments*
1	***Introduction and context***	
1.1	Can you describe your position at *[the organization of the interviewee]*?	Position, tasks and responsibilities.
1.2	What do you associate with the term strategic foresight?	If unfamiliar: discuss the terms of long-term planning, future orientation.
1.3	What are your thoughts on the need for strategic foresight in the *[the industry of the interviewee]*?	Follow-up: why? Is the need for foresight increasing or decreasing? Why? In what areas?
1.4	Which benefit do you expect from foresight activities?	Examples: (1) reduction of uncertainty, (2) warning on discontinuities, (3) influencing the future.
2	***The Current approach to strategic foresight***	
2.1	What are your experiences of strategic foresight within *[the industry of the interviewee]*?	
2.2	Can you describe the current approach for strategic foresight at *[the organization of the interviewee]*?	Time perspective, level of involvement in the company (corporate, business area, functional level)
2.3	What time horizon is used in foresight activities at *[the organization of the interviewee]*?	Follow-up: why?
2.4	How do you perceive the approach for strategic foresight within *[the organization of the interviewee]* as-is?	Is there room for improvement?
2.5	Which benefits have foresight activities created within *[the organization of the interviewee]*?	Please name concrete examples
2.6	Do you measure the success of foresight activities?	

2.7	How is the responsibility for foresight activities assigned within *[the organization of the interviewee]*?	E.g. specific department for foresight, decision-making at the corporate level, or consultants, several teams, etc. Follow-up: why?
2.8	What competencies and experiences do the team responsible for foresight activities have?	
3	***Information gathering***	
3.1	What information sources are used at *[the organization of the interviewee]* in order to anticipate and monitor future developments?	Examples include: (1) internal, external, (2) formal vs. informal, (3) restricted sources that yield a competitive advantage vs. easily accessible sources
3.2	Which methods do *[the organization of the interviewee]* use to gather, assess and disseminate future related information?	Are both qualitative and quantitative methods used, how many, in what combination, etc.
3.3	How are foresight methods selected at *[the organization of the interviewee]*?	Are they chosen regarding (1) aim of foresight exercise, (2) context of the company
4	***Value contribution***	
4.1	How are results from the long-term strategic foresight process used at *[the organization of the interviewee]*?	Please describe the process of a typical foresight activity, if possible: ask to provide a concrete example.
4.2	What are the biggest challenges with a more long-term strategic foresight process today?	
4.3	What macro-factors do you believe are relevant to long term strategic foresight within *[the industry of the interviewee]*?	E.g. PEST, STEEP or other aspects that the interviewee believes to be relevant. Follow-up: does the interviewee believe any aspect to be more important than others?
5	***Time aspects***	
5.1	What time-horizons are applied in *[the organization of the interviewee]* and what time horizons do you believe are necessary for strategic foresight in *[the industry of the interviewee]?*	Follow-up: benefits, challenges, why?

5.2	Can you see any benefits of conducting a foresight analysis in a time horizon of +20-40 years?	Follow-up: why?
5.3	If so, what macro-factors would be possible or impossible to include in such an analysis?	Follow-up: why?
5.4	What organizational levels should be involved in the foresight activities?	Follow-up: why?
5.5	How is it reassured within *[the organization of the interviewee]* that the analyses made are put into action and anchored within the organization?	
5.6	How is it reassured within *[the organization of the interviewee]* that the long-term analyses are connected to the more short-term analyses?	
5.7	How does *[the organization of the interviewee]* cope with cases where the results from the analyses may not be appreciated by employees?	
6	***Additional aspects***	
6.1	Is there anything you would like to add that we have not asked you?	

A.3 Data structure

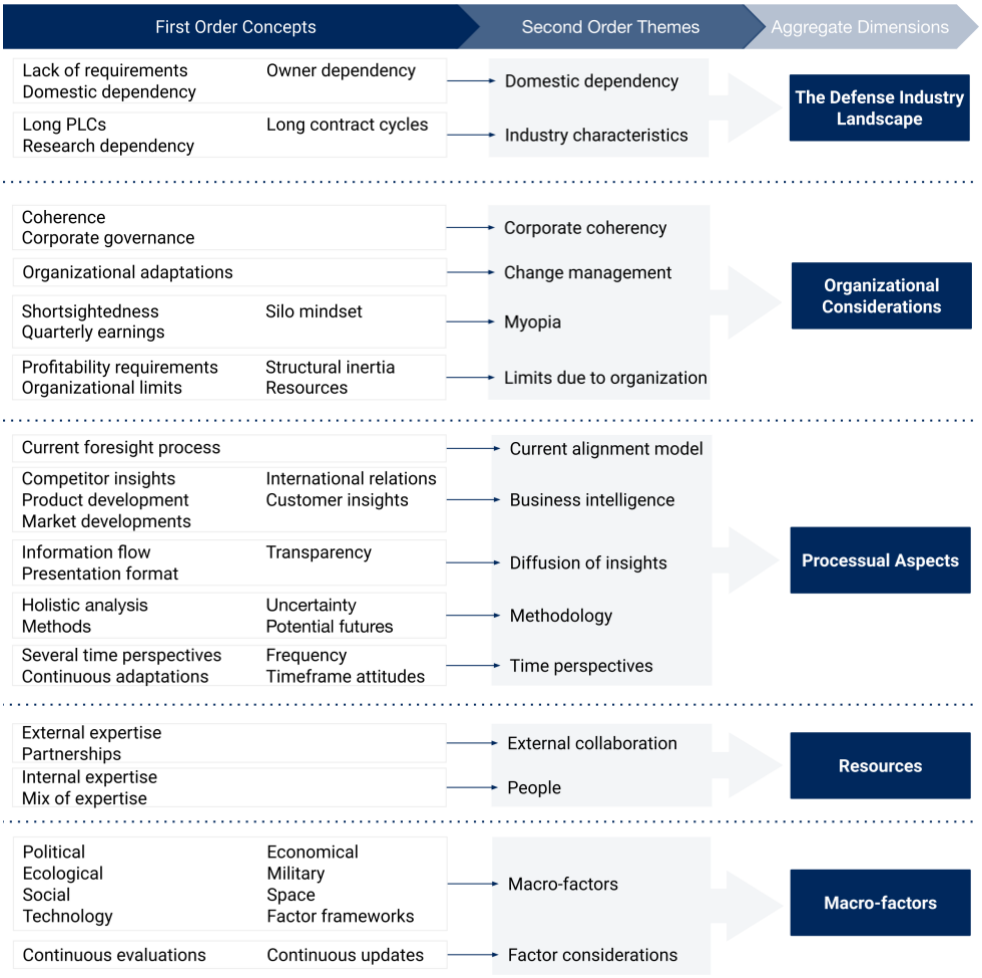


Figure A.1 An overview of the data structure constructed in the data analysis process of the contextual interviews (adopted from Gioia et al., 2012).

Appendix B Delphi Study

This appendix presents the experts participating in the Delphi study, the questions used in each round and the corresponding syntheses from both rounds.

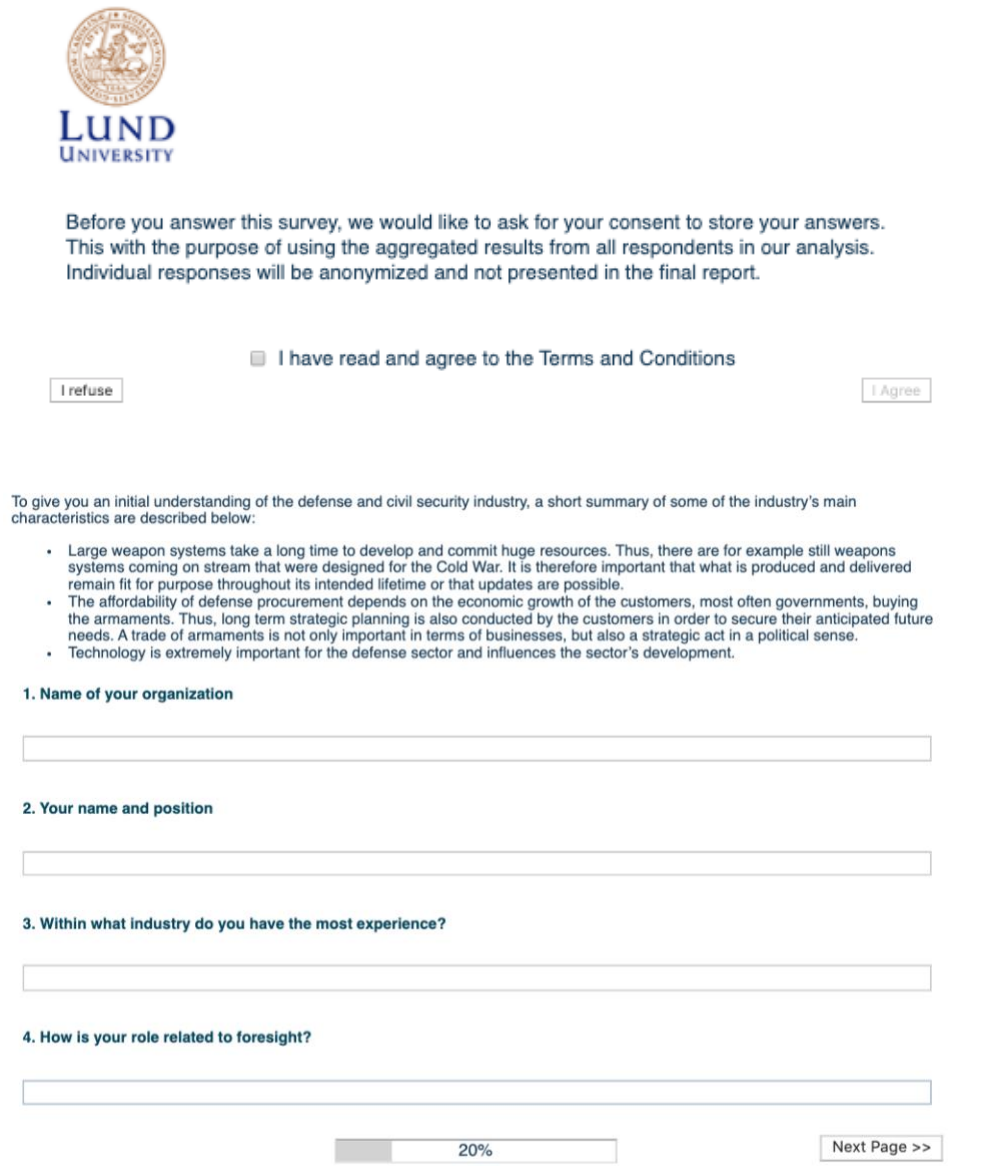
B.1 Experts that Participated in the Study

Table B.1 Anonymized list of the total number of respondents in the Delphi study

Position or Title	***Organization***	***Location***
Associate Professor	Aarhus University	Denmark
Full professor	Universidad Nacional de Colombia	Colombia
Strategic Foresight Specialist	Institute for Work & Health, WFSF	Canada
Director	Copenhagen Institute for Future Studies	Denmark
Professor, Senior Fellow	Walden University	USA
Partner and Management Consultant	InterPares Management Consultants	Sweden
Futurist and Senior Project Manager	Research Institutes of Sweden (RISE)	Sweden
Restrepo Full Professor	Universidad Nacional de Colombia	Colombia
CEO, Futurist	The Millennium Project	USA
Deputy Research Director	The Swedish Defense Research Agency (FOI)	Sweden
Senior Lecturer in Strategic Foresight, Doctor of Philosophy	Monash University	Australia
CEO, Region Director	Region Västerbotten	Sweden
Doctor, Researcher and Advisor	Royal Institute of Technology (KTH), Rohrbeck Heger GmBH.	Sweden
Futurist, CEO	Future Navigator	Denmark
Futurist and Designer, Founder	Futures Present	Canada

CEO and Founder, Adjunct Professor in Innovation Management	Inngage Consulting AB	Sweden
Founder, Foresight Advisor, Foresight Researcher	Thinking Futures	Australia
Advisor and Futurist	Copenhagen Institute for Future Studies	Denmark
CEO and Founder	Kairos Future AB	Sweden
Associate Professor, Founder, Executive Director	Teach the Future	USA
CEO and Futurist	Futurewise AB	Sweden
Assistant Professor	Centro Universitario de la Defensa - Academia General Militar	Spain
Professor, UNESCO Chair in Futures Studies	UNESCO	Australia
Docent in Economic history	*Own firm*	Sweden
Senior Advisor and Future Strategist	Kairos Future AB	Sweden

B.2 First Survey in the Delphi Study



LUND UNIVERSITY

Before you answer this survey, we would like to ask for your consent to store your answers. This with the purpose of using the aggregated results from all respondents in our analysis. Individual responses will be anonymized and not presented in the final report.

I have read and agree to the Terms and Conditions

I refuse

I Agree

To give you an initial understanding of the defense and civil security industry, a short summary of some of the industry's main characteristics are described below:

- Large weapon systems take a long time to develop and commit huge resources. Thus, there are for example still weapons systems coming on stream that were designed for the Cold War. It is therefore important that what is produced and delivered remain fit for purpose throughout its intended lifetime or that updates are possible.
- The affordability of defense procurement depends on the economic growth of the customers, most often governments, buying the armaments. Thus, long term strategic planning is also conducted by the customers in order to secure their anticipated future needs. A trade of armaments is not only important in terms of businesses, but also a strategic act in a political sense.
- Technology is extremely important for the defense sector and influences the sector's development.

1. Name of your organization

2. Your name and position

3. Within what industry do you have the most experience?

4. How is your role related to foresight?

20%

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Section 1. Introduction to the survey - background of the defense and civil security industry

The concept 'long term' within strategic foresight can be defined in many ways. The set of questions in this section will take the outset from your definition of 'long term', related to foresight activities in the defense and civil security industry.

5. List and explain the three most beneficial results that you would expect from foresight activities.

Comment

6. What sources and competencies are necessary or should be used in foresight activities in order to anticipate and monitor future developments?

Comment

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Section 2. Foresight activities

The concept 'long term' within strategic foresight can be defined in many ways. The questions in this section will take the outset from your definition of 'long term', related to foresight activities in the defense and civil security industry.

7. On a scale from 1-5, how important would you consider strategic foresight in the defense and civil security industry to be?

1	2	3	4	5
○	○	○	○	○

Why?

8. What time-horizon do you believe is necessary within long term strategic foresight in the defense and civil security industry?

Please explain why you chose this time horizon.

9. List the benefits you would expect from such an analysis during your proposed time-horizon? Please provide examples.

Please provide examples.

10. List the biggest challenges with pursuing strategic foresight activities during your proposed time-horizon.

Please provide examples.

11. What macro factors do you believe are most important to analyze in your proposed time horizon? Please check the boxes of those factors in the list below.

- [ ] Social
- [ ] Technological
- [ ] Economic
- [ ] Political
- [ ] Legal
- [ ] Environmental
- [ ] Values
- [ ] Military
- [ ] Exclusive / None of the above
- [ ] Other(s)

If other(s), please provide which.

12. Create a list and sort the macro factors that you mentioned in terms of importance, where number 1 indicates the highest priority.

Why?

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Section 3. Strategic foresight in the time perspective of +20-40 years

For the scope of our thesis, the investigated time perspective is +20-40 years. The set of questions in this section will consider the appropriateness of this time horizon within the defense and civil security industry.

13. Do you think a time horizon of +20-40 years would be applicable and sufficient within the defense and civil security industry?

Please explain why.

14. On a scale from 1-5 where one indicates the least challenging, how challenging is strategic foresight in the time perspective of +20-40 years?

- 1
- 2
- 3
- 4
- 5

Comment

15. List the biggest challenges with pursuing strategic foresight activities in the time perspective of +20-40 years within the defense and civil security industry.

Please provide examples.

16. List the most notable benefits with pursuing strategic foresight activities in the time perspective of +20-40 years within the defense and civil security industry.

Please provide examples.

17. How should insights from long term (+20-40 years) strategic foresight activities be presented within an organization in terms of format?

Please explain why.

18. What organizational level(s) should be involved in the long term (+20-40 years) foresight activities?

- [ ] Corporate level
- [ ] Business area level
- [ ] Functional level
- [ ] Other

Comment

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Section 4. Appropriateness of foresight methods

This set of questions will consider the appropriateness of foresight methods in the time perspective of +20-40 years

19. What methods for strategic foresight are applicable in the time horizon +20-40 years?

- [ ] Literature review
- [ ] Expert panels
- [ ] Scenarios
- [ ] Trend extrapolation/megatrends
- [ ] Brainstorming
- [ ] Interviews
- [ ] Delphi
- [ ] Key technologies
- [ ] Questionnaires/surveys
- [ ] Environmental/horizon Scanning
- [ ] SWOT-analysis
- [ ] Cross-impact analysis
- [ ] Causal layered analysis
- [ ] Visioning
- [ ] Backcasting/roadmapping
- [ ] Simulation/gaming
- [ ] Stakeholder analysis
- [ ] Other method(s), please add in the comment section

Comment

20. What number of methods are necessary to combine in order to yield a comprehensive strategic foresight analysis in the time perspective of +20-40 years?

Please explain why you chose this number.

21. How, and in what order, should your proposed strategic foresight methods be combined? Arrange your proposed methods below starting with the methods that should be used first in the strategic foresight analysis process.

Comment

22. Is it possible to combine the methods in another way? If so, please explain how.

Comment

23. How often would you suggest that your proposed combination of methods should be carried out?
E.g. [ ] time(s) each every [ ] year(s)

Comment

24. Is there anything you would like to add that we have not asked you?

<< Previous Page | 100% | Submit

B.3 Second Survey in the Delphi Study

LUND UNIVERSITY

Before you answer this survey, we would like to ask for your consent to store your answers. This with the purpose of using the aggregated results from all respondents in our analysis. Individual responses will be anonymized and not presented in the final report.

I have read and agree to the Terms and Conditions

I refuse | I Agree

Section 1. Time horizons

1. Regarding the performance of a foresight analysis in the time horizon of +20-40 years, the majority of the respondents (62 %) agree that it would be an applicable and sufficient time frame within the defense and civil security industry. However, when asked to suggest an appropriate time horizon for foresight activities most answers were in the interval of +10-20 years. Some also claimed that an even longer horizon than 40 years should be used.

Given that shorter analyses of 0-5 and 5-20 years ahead are performed on a yearly basis in the organization, would you still agree that strategic foresight activities with a time horizon of +20-40 years are beneficial?

- Yes
- No

If no, please explain

10%

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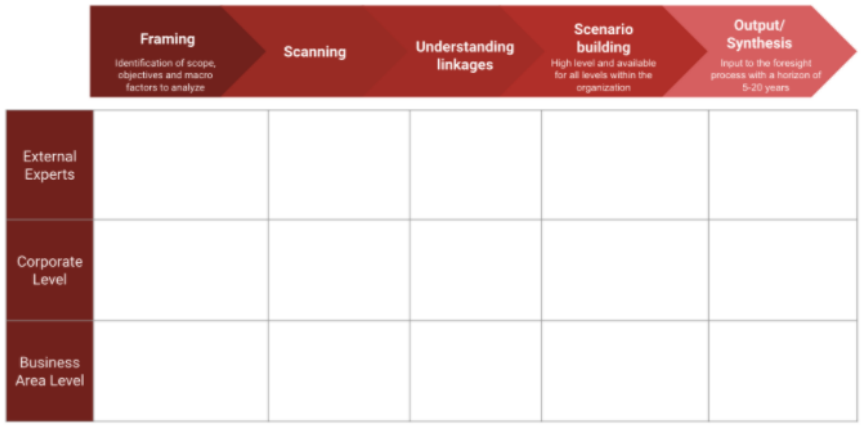
Section 2. Framework



Based on the answers from the first round we have created a prototype of a framework regarding how to perform a strategic foresight analysis in the time horizon of +20-40 years in an organization within the defense and civil security industry. The purpose of these foresight activities are to create a sanity check of and alignment with the current foresight analyses that are performed in the time horizons of 0-5 and 5-20 years, as well as to gain coherence within the organization.

The answers from the first round of questions implied that different combinations of foresight methods or activities are possible. However, the following consensus regarding the structure of the analytical process was deduced:

- Choice of method is dependent on scope, objective and organization.
- Different types of scanning or trend analysis should be included early in the process.
- The scanning should be followed by an analysis of how the identified trends interact and affect each other.
- Scenarios should be developed towards the end (scenario was mentioned as an appropriate method according to 96% of the respondents).
- The developed scenarios should be connected to the present.

Based on this, the prototype of the framework was constructed and divided into five phases, as shown by the process flow in the picture.

This set of questions will consider the application of different methods in the five different phases, and at what level they should be carried out. Please do not select more methods than you believe is necessary.

20%

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Phase 1. Framing

2. Which of the following methods, if any, do you think should be performed on each of the three levels in the framing phase?

	Delphi	Interviews	None	Other
External Experts	☐	☐	☐	☐
Corporate Level	☐	☐	☐	☐
Business Area Level	☐	☐	☐	☐

If other, please add:

30%

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Phase 2. Scanning

3. Which of the following methods, if any, do you think should be performed on each of the three levels in the scanning phase?

	Expert panels	Megatrends	Key technologies	Environmental/ horizontal scanning	Literature review	None	Other
External Experts	☐	☐	☐	☐	☐	☐	☐
Corporate Level	☐	☐	☐	☐	☐	☐	☐
Business Area Level	☐	☐	☐	☐	☐	☐	☐

If other, please add:

40%

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Phase 3. Understanding linkages

4. Which of the following methods, if any, do you think should be performed on each of the three levels in the understanding linkages phase?

	Futures Wheel	Causal Layered Analysis	Field Anomaly Relaxation	Morphological Analysis	None	Other
External Experts	☐	☐	☐	☐	☐	☐
Corporate Level	☐	☐	☐	☐	☐	☐
Business Area Level	☐	☐	☐	☐	☐	☐

If other, please add:

50%

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Phase 4. Scenario Building

5. Which of the following methods, if any, do you think should be performed on each of the three levels in the scenario building phase?

	Exploratory scenarios	Simulation	Gaming	Wild cards	Workshops	None	Other
External Experts	☐	☐	☐	☐	☐	☐	☐
Corporate Level	☐	☐	☐	☐	☐	☐	☐
Business Area Level	☐	☐	☐	☐	☐	☐	☐

If other, please add:

60%

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Phase 5. Output/Synthesis

6. Which of the following methods, if any, do you think should be performed on each of the three levels in the output/synthesis phase?

	Back casting	Normative scenarios	Visioning	Roadmapping	Delphi	Workshops	None	Other
External Experts	☐	☐	☐	☐	☐	☐	☐	☐
Corporate Level	☐	☐	☐	☐	☐	☐	☐	☐
Business Area Level	☐	☐	☐	☐	☐	☐	☐	☐

If other, please add:

70%

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7. In the first round of questions, the answers regarding the frequency of the performance of a long term foresight analysis in the time horizon of +20-40 years were widely dispersed and differed between every fifth year to each month. The most frequent answer (23 % of respondents) was that the analysis should be performed on a yearly basis. An equal part also emphasized that the analysis should be a continuous process, by which the frequency should be different depending on methods used. For the combination of methods that you chose in the previous questions, how often do you think each phase (framing, scanning, understanding linkages, scenario building, output/synthesis)should be performed?

Comment

80%

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Section 3. Organizational Challenges

This set of questions will involve organizational challenges and what potential strategies or methods there may be to mitigate these

8. Based on the results of the first round of this Delphi study a common challenge that was expressed in conducting long-term foresight analysis is to anchor the results in the organization. Can you think of any method or strategy that can mitigate this challenge?

Comment

9. Another identified challenge mentioned by the majority is that the outcome risks being perceived as too fluffy to gain actionable results due to the interdependence of macro factors. Can you think of any method or strategy that can mitigate this challenge?

Comment

90%

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10. All results from this Delphi study will be aggregated. Please confirm that you allow your name, position, and organization to be mentioned in the report in relation to your contribution to the Delphi study. To clarify, no quotations or individual answers will be published.

Please specify how we are allowed to mention your contribution in the comment section below.

- I agree
- I do not agree

State explicitly how you want us to refer to your contribution by providing e.g. your name and/or position and/or organization.

100%

Print Submit

B.4 First Synthesis

Question 1-4 regarded personal information about the respondents.

Question 5.
Expected results from foresight activities are building competence, reducing uncertainty, facilitating prioritization, avoiding myopia, creativity generation, and the creation of a rigid process/structure for planning activities and decision making.

Question 6.
A necessary competency for foresight practitioners is an open and creative mindset, which was mentioned by 80% of the respondents. About 35% emphasized the importance of an interdisciplinary team. Moreover, analytical competence, ability to extract and digest the most critical information, and expert input within critical areas were also common competences mentioned, as well as having a holistic approach.

Question 7.
85% of the respondents assessed the importance of foresight activities within the DCS industry as very high (ranking 5), 8% as high (ranking 4) and 3% as medium (ranking 3), on a scale ranging from 1 (low importance) and 5 (very high importance).

Industry characteristics of the DCS industry were mentioned as being impactful on the level of importance. Such characteristics were expressed as that the DCS industry is characterized by being technology-intensive, having high investment costs, long R&D processes and PLCs, as well as the importance of a competitive point of view in order to be one step ahead of your enemy.

Question 8.
When asked to suggest a suitable time horizon for foresight activities within the DCS industry, 69% of the answers covered the interval of +10-20 years. However, 62% claimed that a longer time horizon than 20 years is applicable and 31% answered 30 years or longer. Moreover, 8% claimed that an even longer time horizon than 40 years should be used.

Furthermore, there are different applicable timeframes for different products

depending on adhering R&D and trends. Also, different factors change at different paces. While technology is known to have rapid shifts, demography, social values, politics, and geopolitics can have a much slower pace of change. Answers that promoted a longer time horizon also highlighted the importance of disconnecting from current constraints and allowing preparedness towards multiple futures.

Question 9.
Exemplified benefits from foresight activities in the time horizons suggested by the respondents were better decision making also regarding product development, coherence, and shared views within the organization as well as increased competence and critical thinking. A commonly identified theme was also proactivity in terms of identification of change and anticipation.

Question 10.
Regarding challenges with pursuing foresight activities in the time horizons suggested by the respondents, it can be concluded that the approach needs to be broad and systematic. Furthermore, the respondents expressed that there is an increased complexity involved when pursuing strategic foresight in a longer time horizon. This is due to aspects such as change management, increased difficulty of creating engagement in the organization, the increased risk of the analysis being indefinable, the interdependence between activities and factors being analyzed as well as the decreased possibility to create actionable results. Moreover, disruptive events and the difficulty to avoid organizational myopia and drawing parallels to the present or history were mentioned as aggravating aspects.

Question 11.
The five most commonly macro-factors identified as important to analyze in a time perspective of +20-40 years within the DCS industry were: technological (92%) and political (92%), economical (89%), environmental (89%), and social (85%). Values and military aspects were identified as important by 77% and 73% of respondents respectively and the legal factor by 58%. A common theme among the answers was that the choice of factors to include in the analysis depends on aspects such as the scope and objective of the project as well as on the focal organization. Other factors mentioned by individual respondents are identified as subgroups of macro-factors that should be allocated to the appropriate macro-factor. Among these subgroups, several belong to the social factor.

Question 12.
When respondents were asked to rank between the different macro-factors, the factors that were identified as most important in question 11 were also those given the highest ranking in terms of importance. Some argued that all macro-factors should be seen as equally important and interdependent. One respondent pointed out the economical factor to be the key driver for all other factors. However, many states that the ranking depends on the focal organization and that the people within the organization should be able to prioritize between factors.

Question 13.
Regarding the performance of a foresight analysis in the time horizon of +20-40 years, the majority of the respondents (62%) agreed that it would be an applicable and sufficient timeframe within the DCS industry. However, 27% did not agree that it was an applicable timeframe and 11% answered that they did not know whether it is an applicable timeframe or not. On the contrary and similar to the answers in question 8, some claimed that +20-40 is too short. Consensus was reached regarding that the time horizon must be dependent on organization and industry.

Question 14.
46% of the respondents assessed the degree of challenge related to foresight activities within the DCS industry to be very challenging (5), 35% answered that it was relatively challenging (4) and 19% answered that it was moderately challenging (3). Denoted themes from comments were that long-term foresight (+20-40 years) might distract the current decision-making, that long-term foresight poses challenges in terms of change management, and that the importance of stakeholder engagement increases by pursuing long-term foresight activities. The term *fluffiness* was recurrent, i.e. the challenge in extracting something clear and concrete from the analysis.

Question 15.
Challenges with foresight activities over a time horizon of +20-40 years are dilemmas of gaining tangible results, the occurrence of disruptive events, stakeholder engagement as well as change management. Also, the uncertainty of some important industry characteristics denoted as military, political, and technological aspects contribute to the challenge.

Question 16.
The most notable benefits with pursuing strategic foresight activities in the time perspective of +20-40 years within the DCS industry were that it can be useful to improve preparedness for military and civil security actions, but also for improving the trajectory of organizational planning, which in turn entails cost savings. However, a few people still highlight that it is impossible to use such a time horizon.

Question 17.
When presenting insights from long-term (+20-40 years) strategic foresight activities in the organization, suitable formats depend on the type of audience to a large extent. The format should be tailored to the recipients of the message and aim to create a basis for discussion. To do this, scenarios are commonly recommended as a method among the recipients to imagine alternative and multiple futures, but also other types of interactive techniques such as gaming.

Question 18.
In terms of involvement of organizational level(s) in long-term (+20-40 years) foresight activities, a majority agreed to involve all levels. 81% wanted to involve the corporate level, 73% wanted to also involve the BA level and 58% wanted to involve the functional level as well. Involvement is important in order to gain buy-in from key stakeholders. Except for internal involvement, a commonly mentioned aspect was the inclusion of experts, scholars, and partners of multiple disciplines.

Question 19.
Regarding the choice of suitable methods for strategic foresight activities in the time horizon +20-40 years, it was agreed upon that the choice of methods is dependent on scope, objective, organization, and setting. The distribution of responses, with a majority, regarding applicable methods to use in foresight activities in the horizon of +20-40 years are presented in Figure B.1.

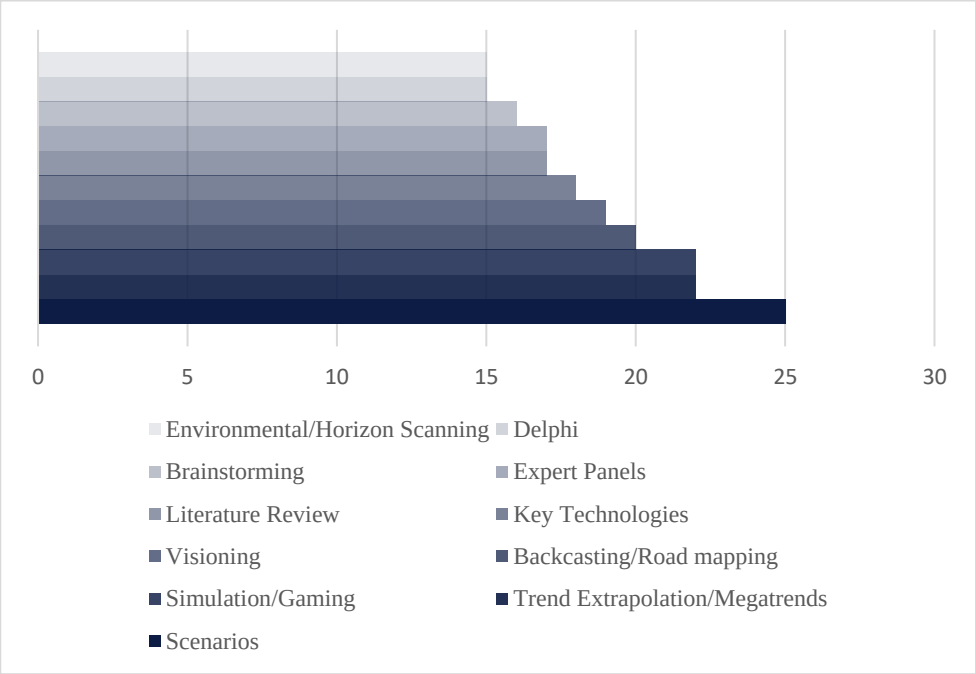

Figure B.1 Distribution of responses regarding applicable methods for foresight activities in the time horizon of +20–40 years.

Methods that were not included in the survey but suggested by more than one expert in the free text field were futures wheel, futures triangle, and morphological approaches.

Question 20.

The necessary number of methods to combine in order to yield a comprehensive strategic foresight analysis in the time perspective of +20-40 years depends on several aspects, ranging from the selection of methods, type of organization, available resources, to the objective of the foresight activities. Even though the most frequent answer was to use three methods or more, there was no consensus regarding a specific number of methods to use. On the contrary, it was commonly mentioned that the more methods used the better results if the quantity does not increase the complexity of the processes too much and thus lower the quality of the analysis.

Question 21.

In terms of combining methods and putting them into a sequence, the answers implied that different combinations of foresight methods are possible.

However, the following conclusion regarding the structure of the analytical process was deduced:

- The choice of method is dependent on scope, objective, and organization. Different types of scanning or trend analysis should be included early in the process.
- The scanning should be followed by an analysis of how the identified trends interact and affect each other.
- Scenarios should be developed towards the end (scenario was mentioned as an appropriate method according to 96% of the respondents).
- The developed scenarios should be connected to the present.

Based on these aspects, a prototype framework was constructed and divided into five phases, each corresponding to one of the bullet points in the list above, as shown in the process flow in Figure B.2. This prototype was later used as a basis for the questions in the second round of the study.

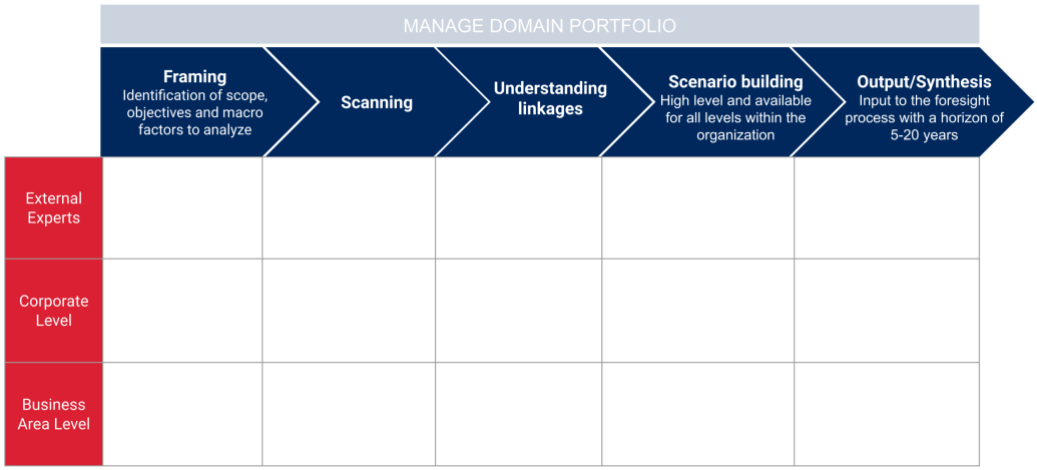

Figure B.2. The prototype framework used for the second round of the Delphi study.

Question 22.

The order and arrangement of methods are important. However, there are several appropriate versions of combinations. The foresight work should be an iterative process, and again the combination depends on organization, purpose, and goal.

Question 23.
The answers regarding the frequency of performing a long-term foresight analysis (+20-40 years) were widely dispersed, ranging from every fifth year to each month. The most frequent answer (23%) was that the analysis should be performed on a yearly basis. An equal part (23%) emphasized that the analysis should be a continuous process, tailored to the project and organizations. These suggestions of appropriate frequency were followed by the suggestions of once every third year and once every second year, which were suggested by 15% of the experts, respectively. Moreover, the frequency should also be different depending on the type of method (e.g. scenarios are not frequent, whereas trends could be carried out continuously).

Question 24.
The last question of the survey was open-ended and gave the respondents a possibility to add aspects that were not directly asked upon in the survey. Most respondents opted out of this question, but it was once again highlighted that interdependency needs to be acknowledged. This with regards to methods, to the different phases in the framework as well as to the chosen macro-factors.

B.5 Second Synthesis

Question 1.
Based on the additional information that analyses of 0-5 and 5-20 years ahead already are performed in the organization the respondents who agreed upon +20-40 years being a sufficient and applicable timeframe for foresight activities increased from 62% to 69% in the second round. The respondents who responded positively to the proposed time horizon argued that it depends on the organization and its strategic priorities and highlighted that it is important to engage users and to have a clearly defined purpose in order for it to be successful.

However, several respondents (31%) did not believe the time horizon of +20-40 years to be relevant. These respondents mean that there will be a lack of engagement from employees or simply that +10-20 years is enough, that a longer horizon only would cause more possibilities and disruptive considerations that are difficult to approach. Instead, it is more important to focus on methodology in order to create a holistic perspective and create actionable results.

Question 2.
Below, the distribution of the respondents' choices of applicable methods in the different phases shown in Figure B.2 and at what level they should be carried out are presented. The respondents were encouraged to not select more methods than they believed to be necessary.

Phase 1. Framing

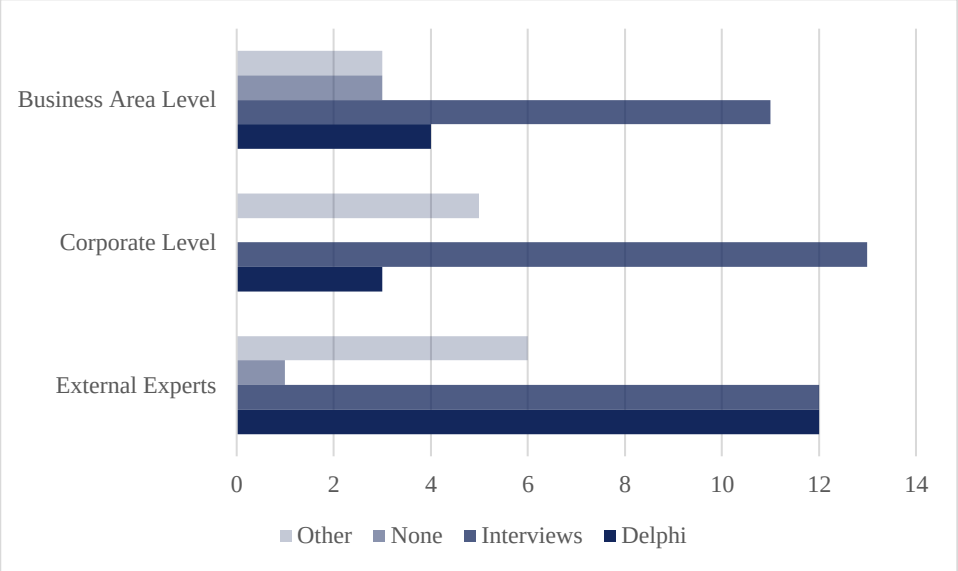

Figure B.3 Distribution of responses of applicable methods in the framing phase.

Figure B.3 outlines the results of what methods the experts would prefer to use on each level in the *framing phase*. In terms of involvement, all respondents agreed upon the participation of the corporate level in one way or another. However, a clear majority of the respondents urged to include experts (94%) and the business level (81%) as well. Internally, the most preferred method was interviews, both for corporate level (75%) and business level (63%). Together with Delphi this also applied for external experts with 69% of the respondents choosing these alternatives, respectively.

In addition to the methods proposed in the survey, several respondents proposed other methods that could be useful in the framing phase. These were: 7-questions, stakeholder analysis, literature search, meta-studies of expert reports, surveys with open-ended questions and questions with scales or multiple-choice answers, futures triangle, Sarkar game (or similar) and trendspotting. It was also proposed that group discussions possibly could suffice in this phase and that interviews can help understand the problem, shape the end-user's expectations and give an indication of how to proceed with the foresight process. Finally, a summary document based on trends and advances in the industry from secondary sources was proposed to serve as a basis for discussion.

Phase 2. Scanning

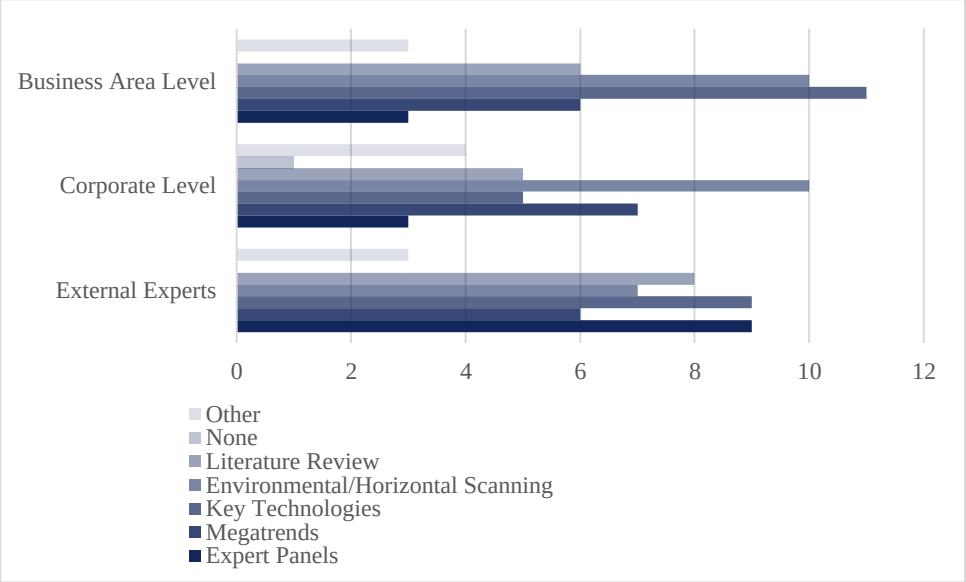

Figure B.4 Distribution of responses of applicable methods in the scanning phase.

Figure B.4 outlines the results regarding what methods the experts would prefer to use on each level in the *scanning phase*. In terms of involvement, all respondents agreed upon the participation of business level and external experts. However, 94% of the respondents preferred to include the corporate level as well. In terms of applicable methods, over 50% of the respondents answered that the method applicable to external experts in this phase were expert panels (56%). Regarding BA level, key technologies (69%) and environmental/horizon scanning (63%) were the methods that received most answers. Environmental/horizon scanning was also mentioned by an equal number of respondents (63%) regarding the corporate level.

Moreover, interactivity in the form of discussion foras and workshops were suggested by respondents. It was also implied that it depends on the issue at hand, why it is difficult to generalize in this step. On the contrary, it was implied by respondents that all available methods should be used.

Phase 3. Understanding linkages

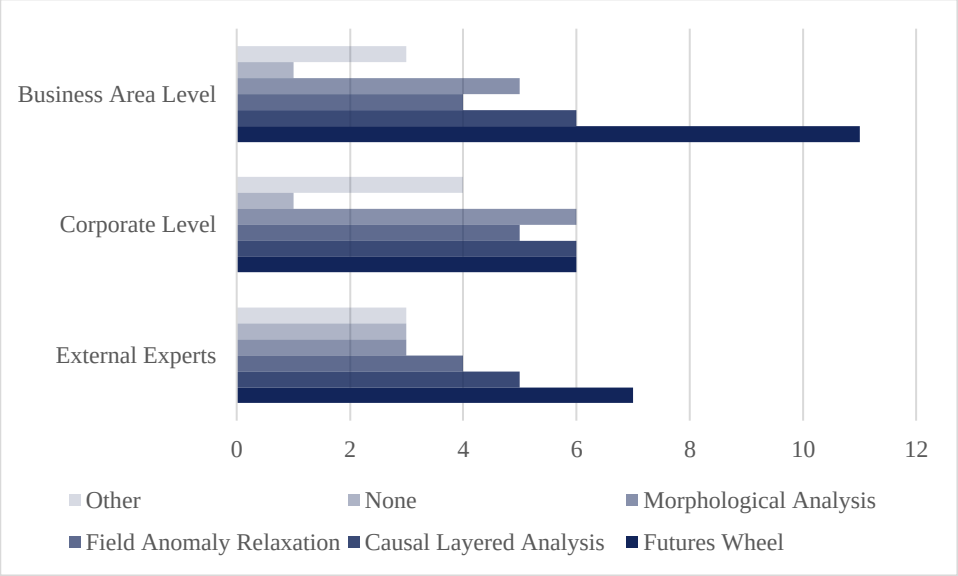

Figure B.5 Distribution of responses of applicable methods in the understanding linkages phase.

Figure B.5 outlines the results regarding what methods the experts would prefer to use on each level in the phase *understanding linkages*. For this phase, the answers were more diverse. The only method that was chosen of a majority of the respondents was the use of futures wheel on the BA level (63%). However, futures wheel for external experts and morphological analysis on a corporate level were chosen among 38% of the respondents.

It was further noted by the respondents that if external experts are to be involved in the foresight project, they should be involved in all steps of the analysis, not only in understanding the linkages and that their participation should be integrated with the internal participation. It was also highlighted that while participants from the corporate level can be involved in all methods, they probably have neither the time nor the ability to participate in this phase.

Phase 4. Scenario-building

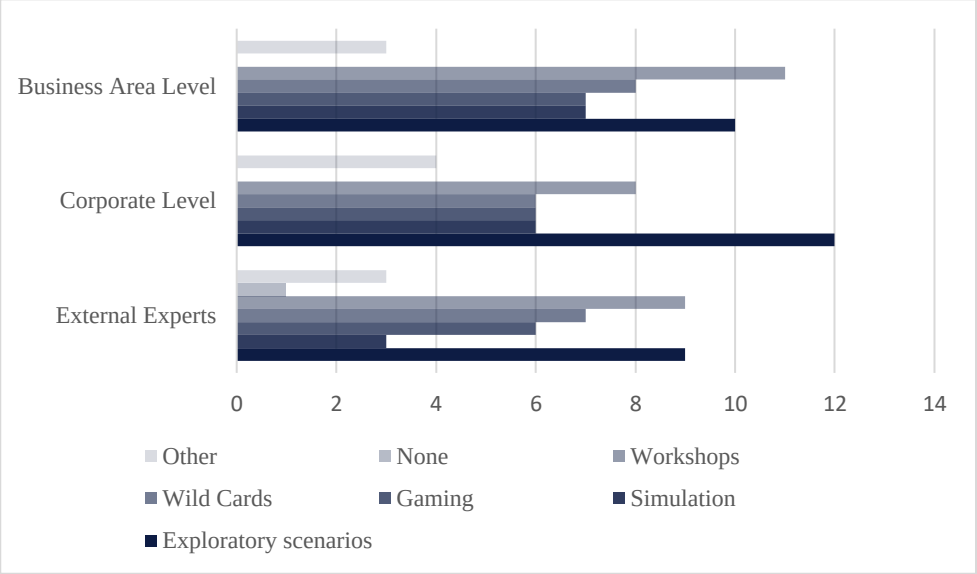

Figure B.6 Distribution of responses of applicable methods in the scenario building phase.

Figure B.6 outlines the results regarding what methods the experts would prefer to use on each level in the *scenario-building phase*. All respondents agreed to involve the corporate and BA level. A clear majority (94%) of the respondents urged to include experts as well. However, the most frequent answers in terms of methods were exploratory scenarios on a corporate level (75%) and workshops on a BA level (69%). Exploratory scenarios were also mentioned by 63% on the BA level. These two methods were also mentioned by 56% of the respondents for the external experts.

In the scenario-building phase, it was again highlighted that if external experts participate, they should be involved in the complete foresight process. However, it was also noted that in this phase it is possible to include external experts to provide additional perspectives when reviewing the results. Regarding the corporate level, it was concluded that it would be beneficial to include representatives in this phase in order to gain immediate ownership and acceptance of results. Timelines were suggested as an additional method to use in this phase by one respondent.

Phase 5. Output/synthesis

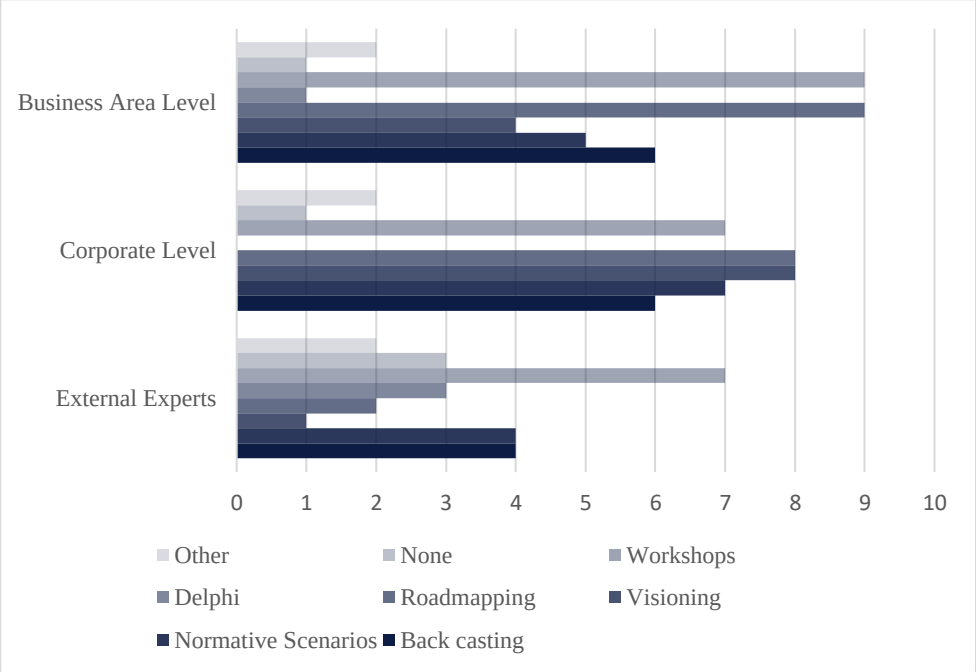

Figure B.7 Distribution of responses of applicable methods in the output/synthesis phase.

Figure B.7 outlines the results regarding what methods the experts would prefer to use on each level in the *output/synthesis phase*. All respondents except one agreed upon the involvement of the corporate and BA level. This one respondent, however, did not understand the question why "none" was chosen as an answer on all three levels. In terms of methods, the answers were diverse, but it was evident that road mapping and workshops, both with 56% of the answers, could be applicable to the BA level. On the corporate level, road mapping and visioning were the most frequently chosen alternatives (50%). If experts are to be involved, the most prominent method mentioned by the respondents were workshops (44%).

In this phase, the respondents did not comment any further on their choices of appropriate methods.

Question 7.

The answers to how often each phase should be conducted were diverse and ranged from every few months to every ten years, resulting in a mean value of every third year. However, the scanning should be performed continuously in order to spot weak signals and trends. It was argued that it depends on

what is researched and the rate of change within the identified domains of the study. It was also highlighted that if the initial work is done properly, a set of key indicators can be generated that can indicate the direction of reality and a complete update is only necessary when disruptive events, conflicts, or other issues arise. One respondent suggested that this could be done through computer supported methods e.g. EIDOS, that makes it possible to follow up on progression automatically. However, in-between the complete updates, the analysis must be diffused in the organization and the conclusions should be reassessed, which in turn can be used as preparatory work for the coming consecutive update. To summarize, a more long-term view must be supplemented with a rolling three-year update within which more frequent minor updates are undertaken based on continuous course-checking activities. Major shifts due to disruptive events may, however, create a need to conduct a complete analysis within a shorter timeframe.

Question 8.

In order to better anchor the results in the organization, 46% of the respondents brought up ideas concerning broad participation of key representatives from several levels and functions, who need to commit that the results will be input in the strategic planning in advance. Moreover, collaborative and interactive methods were suggested, such as workshops, seminars, or anticipatory action learning in order to spread the word and get diverse input. However, it was noted that top management should initiate, be responsible, and approve the process. Another common aspect brought up was to link the results to an organizational vision and build a short-term action plan or roadmap based on the vision. Methods mentioned in relation to this are back-casting and road mapping that could be effective when strategizing by facilitating the process of getting everyone to understand the path forward, why it looks the way it does, and their own part in it. In addition, it was also suggested that those conducting the foresight activities should be seen as stakeholders to increase their importance.

Question 9.

In order to mitigate that the outcome of foresight activities is perceived as too indefinable to gain actionable results three overarching themes emerged. The first theme is a contingency for each scenario or event, which means that actions, hedging-options, strategies, or policies should be predefined and ready to apply when a specific trend or scenario becomes more probable. Backcasting was mentioned as a useful method in relation to this theme. The second theme is to create awareness and commitment throughout the

organization. It was emphasized that the outcome is highly dependent on expectations and setting the initial frame right as well as to use the results for general strategic conversations throughout the organization. Using efficient and convincing presentation formats such as storytelling as well as keeping the research on a basic level were also highlighted aspects adhering to this theme. Finally, the last theme considers gaming exercises and design thinking as methods to adopt in order to generate specific proposals from the results of foresight as well as to playoff corporate/business level strategy against certain changes.

Question 10.
This question assured that the respondent confirmed that their contribution was mentioned in this thesis.