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BUSINESS AND PRODUCT STRATEGY OF A SOFTWARE PRODUCT

Master's thesis

Technology Competence Management

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Teemu Rannikko

HAMK
Hämeen ammatti-
korkeakoulu

Teknologiaosaamisen Johtaminen, YAMK
Tekijä Teemu Rannikko
Työn nimi Ohjelmistotuotteen liiketoiminta- ja tuotestrategia
Ohjaaja Janne Sundelin

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Opinnäytetyön aiheena oli ohjelmistotuotteen liiketoiminta- ja tuotestrategia. Työ keskittyi ohjelmistotuotteen integroimiseen teknologiayrityksen tuoteportfolioon. Sen tavoitteena oli haastattelututkimuksen ja muiden taustatutkimusten avulla luoda ohjelmistotuotteelle uusi liiketoiminta- ja tuotestrategia.

Opinnäytetyön teoreettinen osuus keskittyy liiketoiminta- ja teknologiastrategiaan, strategiaprosesseihin ja tuoteportfolion hallintaan.

Tutkimusosuudessa toteutettiin laadullinen haastattelututkimus, jossa haastateltiin liiketoiminta-alueita ja muita liiketoiminnan edustajia globaalisti. Tutkimuksen tavoitteena oli selvittää tuotteen nykytila liiketoiminta-alueittain ja kartoittaa kasvupotentiaalia sekä sitä, mitkä tuotteen osat ja ominaisuudet tuottavat eniten arvoa loppuasiakkaalle.

Tutkimusosuutta tukivat osana strategiatyötä aiemmin tehty taustaselvitys sekä opinnäytetyöosuuden rinnalla toteutettu kilpailija- ja markkinaselvitys. Näiden tausta-aineistojen pohjalta luotiin uuden tuotteen liiketoiminta- ja tuotestrategia hyödyntämällä skenaariomenetelmää ja SWOT-analyysiä, sekä suunniteltiin toteutuksen seuraavat vaiheet.

Johtopäätöksissä on analysoitu teknologiavalintojen merkitystä suuressa organisaatiossa, jossa on monia tuoteperheitä ja tuotteita, tuoteportfolion hallinnan merkitystä ja tuoteintegraatioihin liittyvää teknisen velan hallintaa.

Tämän työn tarkoituksena on toimia mallina, miten vastaavien integraatioiden tulisi toimia tulevaisuudessa ja tuotevalikoimaan sisällytettävien tuotteiden integraatio voidaan tehdä paremmin. Raportti on tehty sisällöltään yleistetysti ja konteksti rajattu riittävän yleiselle tasolle, jotta sitä voidaan jatkossa käyttää myös muissa vastaavissa tapauksissa ja muissa yrityksissä.

Avainsanat Liiketoimintastrategia, Tuotestrategia, Teknologiastrategia, Tuotejohtaminen
Sivut 66 sivua ja liitteitä 1 sivua

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Technology Competence Management, M.Eng. Abstract
Author Teemu Rannikko Year 2024
Subject Business and product strategy of a software product
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The topic of the thesis was the business and product strategy of a software product. The work focused on integrating the software product into the technology company's product portfolio. The target was to use interview research and other background studies to create a new business and product strategy for a software product.

The theoretical part focuses on business and technology strategy, strategy process and product portfolio management.

In the research part of the thesis, a qualitative interview research was conducted in which business areas and other business representatives were interviewed globally. The aim of the research was to determine the current state of the product by business area and to map the growth potential as well as which parts and features of the product create the most value for the end customer.

The research part was supported as part of the strategy work by a background study conducted earlier and a competitor and market survey conducted alongside the thesis research part. Based on these background materials the business and product strategy for the new product were created by utilizing scenario method with SWOT-analysis and plan for the next steps of the implementation.

In the conclusions, the significance of technology selections in a large organization with many product families and products, the importance of product portfolio management and technical debt management related to product integrations have been analyzed. The purpose of this thesis is to serve as a model for how similar integrations should be done in the future and the takeover of products to be integrated into the product portfolio can be done better. This report was made in a suitably generalized manner in terms of content, and the context is limited to a sufficiently general level so that it can also be used in other similar cases and other companies in the future.

Keywords Business strategy, Product strategy, Technology Strategy, Product portfolio management
Pages 66 pages and appendices 1 pages

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1 Introduction

The topic of the thesis is the business and product strategy of a software product. The work focuses on integrating the software product into the technology company's product portfolio. Industrial software is part of the company's service business. The target of the thesis is to use interview research and other background studies to create a new business and product strategy for the software product.

The product is technologically obsolete and no longer meets today's requirements properly. From a business point of view, the product has growth potential. However, the growth potential of its business and the technical characteristics of the product and the technologies used must be examined. Then the business and technology strategy must be built based on these. The thesis combines many elements of the degree program in technology competence management: future work, digitalization, strategy, and entities related to management.

The theoretical part of the thesis focuses on business and technology strategy, strategy process and product portfolio management. In the research part of the thesis, a qualitative interview research was conducted in which business areas and other business representatives were interviewed globally. The aim of the research was to determine the current state of the product by business area and to map the growth potential as well as which parts and features of the product generate the most value for the end customer. The interview survey was supported as part of the strategy work by a background study conducted about six months earlier and a market survey conducted alongside the interview survey. In the background study, an external party investigated the current state of the product's business and technology and produced comprehensive material on these. In the market survey, a competitor and market analysis of the current state of the product and its business based on the defined assignment was done by the company specialist. Based on all these above and a few workshops, scenarios of business strategy and product strategy for the new product were built.

At the end of the report, the significance of technology choices in a large organization with many product families and products, the importance of product portfolio management and technical debt management related to product integrations have been analyzed. The purpose of this thesis is to serve as a model for how similar integrations should work in the future. In and the takeover of products to be integrated into the product portfolio can be done better. This report was made in a suitably generalized manner in terms of content, and the context is limited to a sufficiently general level so that it can also be used in other similar cases and

other companies in the future. No business secrets or details have been released in the report.

2 Strategy

The key concept of the thesis is strategy. The term is originally associated with the doctrines of warfare, but in business it can be taken to mean a holistic and far-reaching mission statement or plan through which an organization seeks to achieve its chosen goals and aspirations (Kerttunen, 2007). Strategy can also be defined as conscious choices of goals and actions, the ability of a company to control the environment and internal and external factors, so that the goals are achieved (Kamensky, 2015, pp. 18–19). On the other hand, it can also be difficult to find an unambiguous definition, but already in the 1970s, Henry Mintzberg identified five types of strategy that make up the 5P model, according to which a strategy can be used as a plan, ploy, pattern, position, or perspective. Minzberg's theories have been utilized over the decades, and they are also reflected in the day-to-day strategy work of companies (Tanner, 2024, p. 30). Alfred D. Chandler, on the other hand, described strategy as defining the company's long-term goals and objectives, as well as allocating the procedures and resources needed to achieve them. Michael Porter defined competitive strategy as diversity and deliberate choices to produce a unique combination of values. (Johnson et al., 2011, p. 4)

For a company, strategy is a decision about how it wants and intends to succeed. The strategy guides the direction to be pursued. It is a way to prioritize daily activities. Strategy should be the basis of everything we do. An effective strategy defines goals at different levels so that they can be concretized into measurable tasks at the individual level. In one way or another, every choice should be based on a strategy, so that resources can be focused on the right things. (Sutinen & Haapakorva, 2021, pp. 41–42)

Thus, a strategy is needed to define the direction of the company towards the vision set. It aligns and unifies the activities of the organization, defines the mission, and creates identity, as well as ensures consistency and responds to the organization's need to be managed. It is used to define products, customers, future goals, and the chronology of operations. Strategy helps the organization to operate efficiently without having to question every single issue daily when they support strategic goals. (Juuti & Luoma, 2022, Chapter ”Kohti strategisen johtamisen maailmoja / Mihin strategiaa tarvitaan?”)

The strategy can be divided into different levels. A company-level strategy serves the entire company and its entire business. A business-level strategy is for the needs of an individual business, and operational strategies support these in such a way that the company can utilize resources, processes, and people in the most efficient way. (Johnson et al., 2011, p. 7)

However, the mere existence of a strategy is not enough to succeed. People are needed to make it happen. What matters is how the company is managed and how the different levels of the organization understand the strategy and know how to act accordingly daily. Successful leadership requires interpersonal, conceptual, and technical skills. Management is divided into strategic and operational, of which strategic management is defining the direction of business and deciding on larger lines and focuses on managing the organization in relation to the environment. It means defining goals, values, defining and implementing strategy, and managing changes and reforms. Correspondingly, operational management refers to day-to-day situational management. It means organizing operations, guiding the members of the organization, and committing them to act in accordance with strategic goals. (Viitala & Jylhä, 2019, chapter 1)

In their book, Sutinen and Haapakorva emphasize that strategic management in a company must be visible in everyday life. In practice that means that discussion and activities are done in different organization levels about who does what and by when. The deadlines are set by the company itself. The persons responsible for the strategy objectives must systematically monitor the progress of the measures and report upwards so that the top-level strategic objectives progress on schedule. Large organizations usually have appointed responsible persons who are responsible for strategic management of the company or parts of it full-time. In addition to the progress of the strategic objectives, it is important to communicate their status. When sufficient communication is built around the strategy at different levels of the organization, the goals are integrated as part of everyday work. Especially in major changes, this is essential. (Sutinen & Haapakorva, 2022, pp. 169–170)

2.1 Key concepts of the strategy

In his book, Mika Kamensky describes the company's mission as a key element of strategy, which is formed by the combined effect of the mission statement, vision, and values. The mission statement answers the question "Why does the company exist?". It defines the company's mission in the world and business environment. The mission statement must be able to guide the company's operations and be as permanent a part of the strategy as possible. With its help, it is determined in which area the company operates, as well as the meaning of the existence of the company. The mission statement is also often strongly tied to values. A vision is the target state that a company strives for. It defines what kind and situation a company will be like when it achieves its goals. A good vision changes based on operating environment and external factors and creates positive pressure for the company's success. (Kamensky, 2015, pp. 69–71)

Values form the basis of the company's operations and define the corporate culture, as well as guide the actions of individuals and the organization. Typically, the values have been formed in such a way that they also strongly consider issues outside the business, such as the environment and people related to social responsibility. Values or their categories may include, for example, renewal, customer orientation, safety, and equality. (Viitala & Jylhä, 2019, chapter 2 "Strateginen johtaminen / Yrityksen päämäärät")

Megatrends describe extensive and interrelated long-term phenomena in the operating environment. They are macro-level phenomena that are interrelated. Megatrends guide the company's strategy work and may be related to, for example, the development of digitalization, globalization, ecological thinking, or the ageing of the population. According to a report published by Sitra, at the beginning of 2023, megatrends can be divided under the following headings: The carrying capacity of nature is crumbling, challenges to well-being are increasing, the struggle for democracy is intensifying, competition for digital power is accelerating, and the foundations of the economy are cracking. (Sitra, 2023)

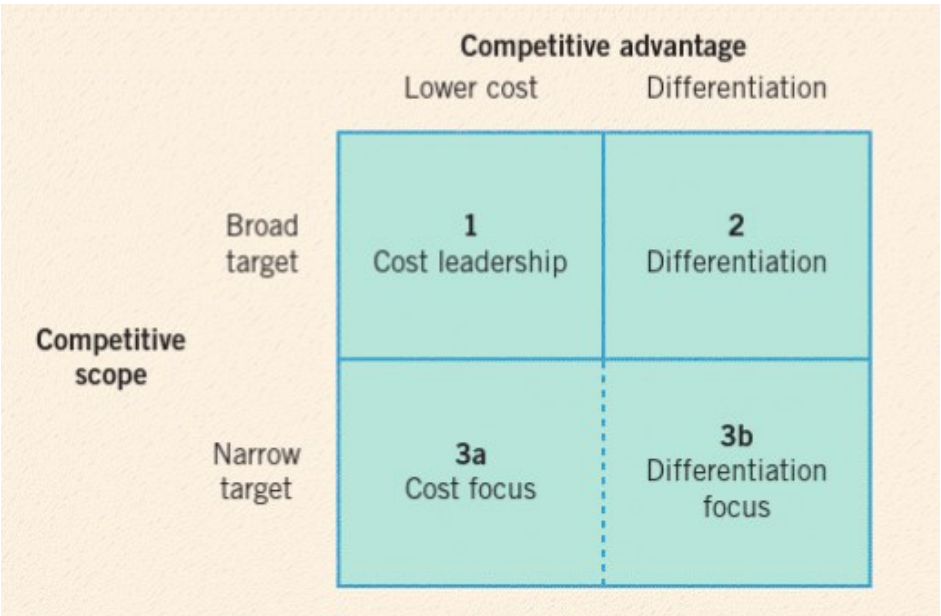
2.2 Business strategy

Usually in the business world, when the term strategy is used, it refers to business strategy. It is a kind of umbrella that sets the framework for other sub-strategies. These include, for example, product development, communications, personnel, and production strategy. (Viitala & Jylhä, 2019, chapter 2). Kamensky describes business strategy as a competitive strategy with which a company can create a competitive advantage in its chosen business areas. When an organization's task is to satisfy the needs of people or other organizations, resources and expertise are needed. This creates a competitive situation in which customers look at the matter from their own point of view. From the customer's point of view, the supplier offering the best possible benefit/price ratio is the best. From the company's point of view, it is a value/cost ratio, which requires competitive advantages over competitors. The dependencies between these factors are illustrated in Figure 1. (Kamensky, 2015, pp. 24–25)

Figure 1. Business strategy triangle (Adapted from Kamensky, 2015, p. 24).

According to Michael Porter, there are two fundamental reasons for gaining a competitive advantage. An organization has a lower cost level than its competitors or offers significantly higher value products or services from its competitors and can therefore afford to be more expensive than its competitors. Based on these aspects, the business strategy can be built based on either cost or differentiation factors. Figure 2 illustrates the basic types of Porter's business strategy models. (Johnson et al., 2017, pp. 144–145)

Figure 2. Business strategy models (Johnson et al., 2017, p. 145).



The Cost Leadership strategy model aims to achieve the lowest cost level on the market and thereby gain a competitive advantage. In this model, the cost of raw materials and labor is

significant. The size of the business is also important. It is worth investing more in product development, even if the one-time investment is significant, If the turnover is high and if the unit price can be significantly lower with a large product volume. In this case, the R&D investment payback time is short. The differentiation model aims to differentiate itself from competitors through product or service features and focuses on offering something that competitors cannot offer. It can be related to quality, characteristics, warranty, safety, style, or other similar factors. In addition to these two models, one can focus on the narrow target model (Cost Focus, Cost Differentiation) so that the business focuses on selected, customized products and customers. Rarely only one of the business strategy models described above is selected, which is why combinations are often made. (Johnson et al., 2017, pp. 146–154)

2.3 Technology strategy

Technology strategy is an important part of a company's overall strategy. Its purpose is to define the relationships between technologies and business. This strategy covers the technological competencies that constitute the company's competitive advantage. Technology must be an integral part of the company's products, services and processes, and the company must be able to assess the life cycle of technologies and identify potential disruptors. This means that the capabilities and features enabled by technology must be evaluated and utilized effectively to support the goals of the business strategy and the growth of the company.

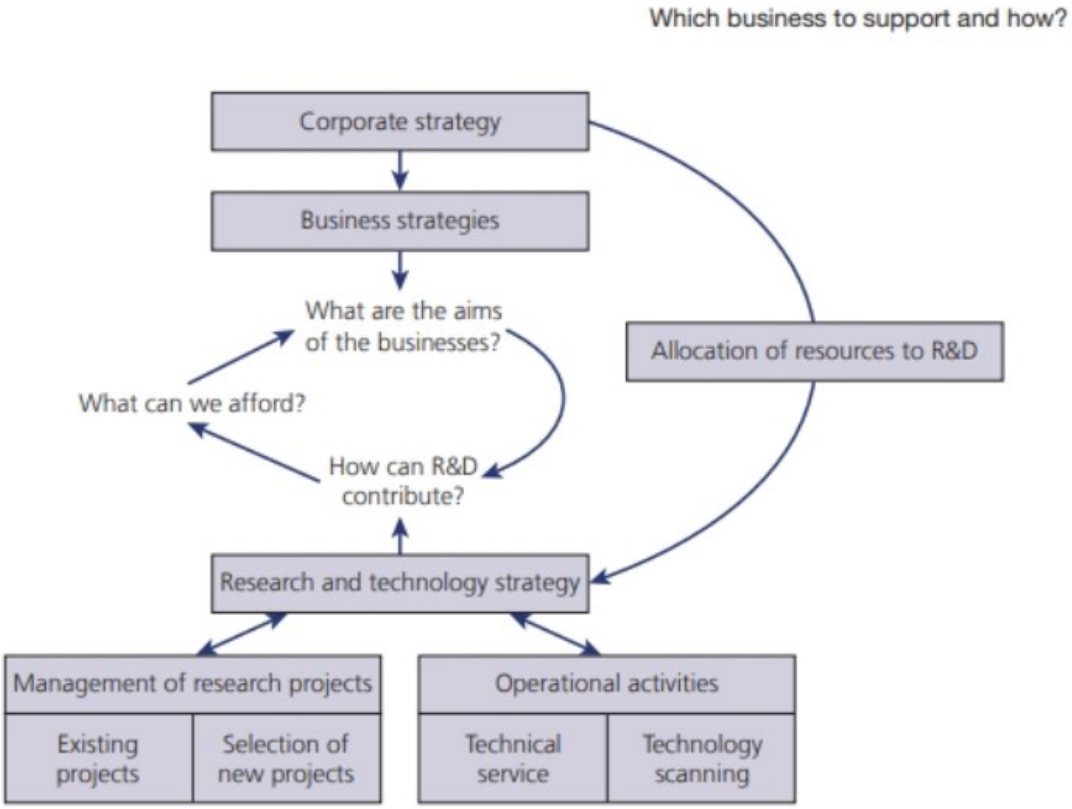
Technology strategy is the basis of business strategy and company’s competitiveness. It answers questions such as:

- What technologies, know-how and other capabilities are needed to achieve competitive advantage?
- What technologies should be used?
- What is the level of investment in R&D?
- What development work is done in-house and what is outsourced outside the company?

Careful consideration of these issues and the right direction and selections in the technology strategy are key to a successful business. (Sahlman, 2010, pp. 33–34)

A well-functioning strategy also requires comprehensive future work, forecasting and anticipation. It is often difficult because there are many external variables: social, economic, political, and technological factors. For this reason, strategy work requires effective dialogue between organizations and at different levels of them. The company's capable R&D enables the existence and development of the business. Therefore, it is important that R&D is managed according to business needs. Figure 3 shows the relation between a company's business and product development. (Trott, 2021, pp. 295–296, 301)

Figure 3. The connection between business and product strategy (Trott, 2021, p. 301).

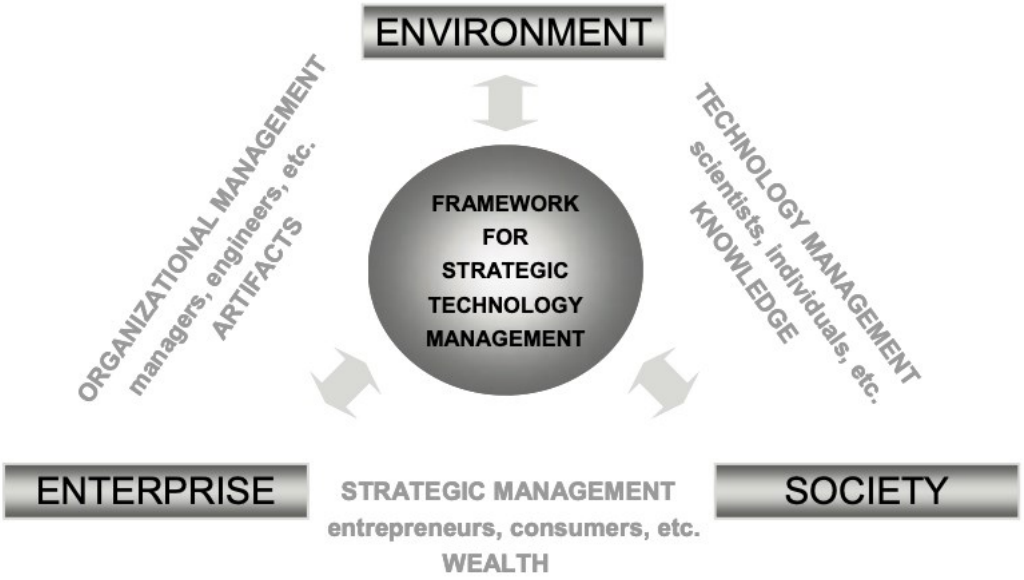


Innovative, new products bring benefits and added value to the customer. The effects of developing a new product can be viewed from different directions on business point of view. The capabilities of the technologies enable the fulfillment of modern features and requirements and enables new business opportunities. When developing a new product, there is a need to consider how it will approach the existing product portfolio, whether it will completely replace the existing product, and how the installation base of the current product will be managed. (Trott, 2021, pp. 392–394)

Strategic technology management consists of organizational management, knowledge management, innovation management, and research and product development management. The framework of technology management can be examined as shown in

Figure 4 below, where enterprise, environment and society form a whole in which the different topics of management are interconnected. Seven different themes can be identified under the theme of strategic technology management: strategy and technology, national technology management systems, sources of competitive strategy, manufacturing, new product development, knowledge management, invention and patent management, and life cycles and discontinuities. (Sahlman, 2010, pp. 27–29)

Figure 4. Technology management framework (Sahlman, 2010, p. 28).



Innovation management ensures active and successful innovation activities from finding ideas all the way to the implementation phase. Innovations and innovativeness are prerequisites, especially for technology-dependent companies. Success requires innovation to be able to offer new products and services. Rapid technological development is an essential reason for the need for renewal and a measure of a company's success. (Viitala & Jylhä, 2019, chapter 2)

A company's innovation activities require the entire organization to make comprehensive use of the owners' intent, customer needs and information about new opportunities. Valpola raises two challenges related to innovation activities, the first of which is achieving a common vision for innovation activities. There product development, management and business must be brought together to familiarize themselves with new phenomena. This will alleviate the hesitation related to commercialization in the decision-making situation. For this reason, innovation process should be a regular process as part of the company's annual clock so that it regularly supports the technology strategy. Another challenge Valpola highlights is the use of customer needs and customer interface feedback for product development. Customer

requirements must therefore be made part of continuous, systematic part of a process. (Valpola, 2021, pp. 202–203)

2.4 Human resources strategy and competence management

The human resources strategy guides the management of the company's personnel. Its sub-areas are personnel planning and procurement, orientation, competence development, performance monitoring and rewarding, well-being at work, dismissal and relocation, and daily management. The purpose of human resource management is that the organization has the right number of people with the necessary competence and high motivation to implement their goals and thus strategy. (Viitala, 2007, p. 24)

Defining competence needs in human resource management is essential. It can be used to ensure that the organization has the necessary competence. Competitiveness can be in direct proportion to what kind of competence a company has and how it can be utilized in the right way. Competence needs can be identified through a mapping that defines current and future competence requirements. Competence is often assessed by the immediate supervisor and the person himself/herself. For example, there may be 6 levels of competence, the lowest of which indicates that there is no competence, the middle level (3) that the person master’s the matter and is able to apply their knowledge to substance. At the highest level, a person is an in-depth expert in a subject area and able to apply their knowledge extensively and develop the subject area from the point of view of the entire organization. (Viitala, 2021, chapter 3.3)

Once the competence needs have been identified and compiled into a competence matrix, the current state can be analyzed, and an action plan can be drawn up based on it. The plan defines what competence is to be developed, what it aims to achieve and what measures it requires. The plan should also include a schedule, resources, and budget. Competence can be developed in different ways, such as through training, mentoring, job rotation, and self-learning. (Viitala, 2021, chapter 3.6)

3 Strategy process

The strategic objective can be defined in two ways. Vision-driven goal setting is often set by owners or senior management, and it aims at disruptive growth and includes uncertainty and risk factors. Correspondingly, goal setting according to potential focuses more on an analytical approach to one's own market potential and competitiveness. It forms an understanding of company's own position and seeks incremental growth through successes. The aim is to apply these two different approaches in parallel to achieve the best possible outcome. (Sutinen & Haapakorva, 2021, pp. 53–56)

Strategy work can be summarized in the following questions:

- Understanding the current situation: Where are we now?
- Vision of the future: What future operating environment and competition are we aiming for?
- Choices to achieve the intent: What measures are required for the success of the company?
- Implementation of measures: How will the desired changes be implemented?

The work phases in strategy work are formed around these four phases. For the success of the process, it is essential that different levels and roles of the organization are involved in the different phases. (Sutinen & Haapakorva, 2021, pp. 58–64)

Strategy planning is often carried out top-down in an organization, where owners and top management decide on the strategy, which is communicated to the different levels of the company. Strategies can exist at different levels, but they are interlinked so that the higher-level strategy always guides the level below. In a good strategy process, dialogue is two-way and interactive between parts and levels of the organization. This commits the entire company to the implementation of the strategy. (Viitala & Jylhä, 2019, chapter 2 "Strategia")

Strategy and strategy work can be open or closed. An open strategy means strong stakeholder involvement at different levels as part of strategy work. Correspondingly, a closed strategy refers to the opposite of this, where the strategy is created by a small group. It cannot be shown that one way is better than the other, although the open way is more modern. Both directions have their strengths and challenges, and both ways can create a good strategy and thus succeed in business. (Leskelä & Luomaranta, 2023, pp. 13–18)

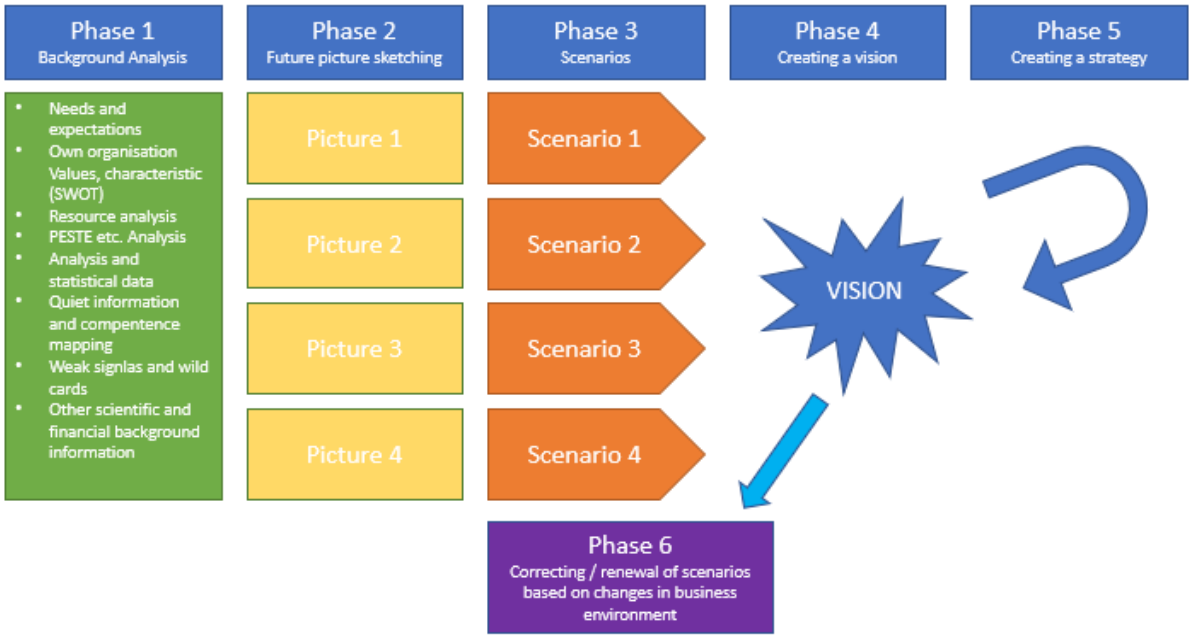
Strategic planning begins with the definition of a strategic goal, a vision. In this case, strategic targets are defined with indicators related to business objectives, such as growth, profitability, renewal and return on capital, as well as competitive advantages. After defining the goal, a strategy formulation is carried out, which defines the means for achieving the goals in the strategy period. The length of the strategy period is often a few years, but the periods are often put together sequentially in the planning process to ensure continuity towards the vision in the long term. Implementation of the strategy means turning it into practical decisions and actions. A prerequisite for this is that everyone knows the strategy and wants to be involved in implementing it. The role of superiors at different levels in defining and communicating concrete impacts for their area of responsibility is significant. The implementation and success of the strategy are evaluated using the indicators defined in it. It is also essential that responsible persons are defined for the objectives and measures. (Viitala & Jylhä, 2019, chapter 2 "Strategia")

3.1 Scenario work

Scenario methods are an effective way to assess the impact of different development options on an organization's activities and opportunities, such as the information society or globalization phenomena. A good scenario helps in planning and decision-making for the future. Scenario work should be a continuous activity, not just a momentary transection of the future. (Rubin, 2012)

Scenario work is used as a tool for futures research. It envisions alternative states of the future. The scenarios are used to illustrate the development of the current situation step by step towards the future. They must be consistent, credible, and recognizable paths to the future. In scenario work, the goal of the chosen development paths is usually often at least 5 years away. The stages of scenario work are shown in Figure 5. The work can be divided into six different phases. (Rubin, 2012)

Figure 5. Phases of scenario work (Adapted from Rubin, 2012).



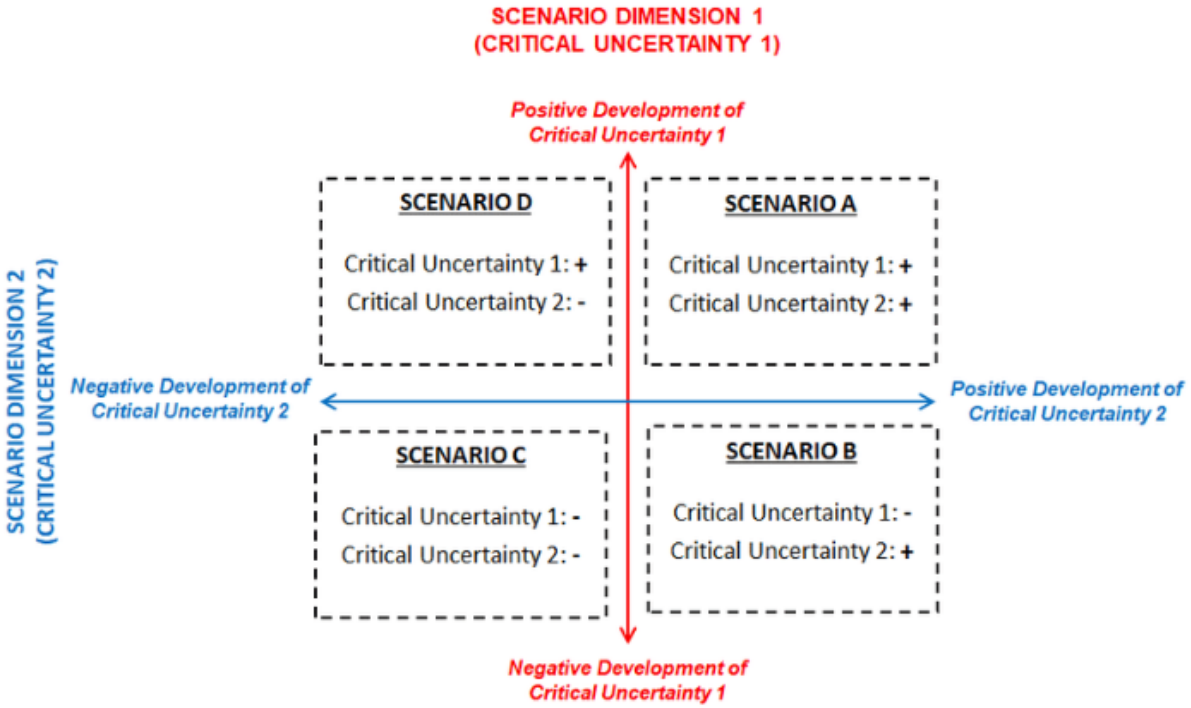
In phase 1, background analysis is carried out and the current state is assessed. For example, PESTE or SWOT analysis can be used. SWOT analysis is a four-field matrix that can be used to examine strengths, weaknesses, opportunities, and threats. This topic is discussed in more detail in chapter 3.2. PESTE analysis is explained in chapter 3.3. In addition, the available resources and external factors, values, hopes, fears, and goals affecting the development path must be considered in scenario work. (Rubin, n.d.)

In phase 2 of the scenario work, future scenarios are drawn up, on which the scenarios defined in phase 3 are based. From the point of view of objective examination, it is important to include scenarios from different categories. There should be at least 3 scenarios and they can be classified into probable, desirable and threatening. The probable scenario describes a continuous future without significant change and development. The desired scenario means positive change and correspondingly the threatening scenario means negative change. In stage 4, a description of the organization's intent, vision, is drawn up based on the scenarios. At its best, a vision is a unified view of the will. Based on these, a strategy will be created in phase 5. Phase 6 refers to correcting scenarios based on new information. At its best, scenario work is a process that opens new perspectives on operational planning. Changes outside the organization affect the scenarios. These may include, for example, technological development or globalization. For this reason, it is worth reviewing the scenarios from time to time and reviewing their scope to align them with the company's strategy and needs in a changing environment. (Rubin, n.d.)

The scenarios can be examined, for example, in a 2x2 matrix, where two different critical

uncertainties with their extremes and the scenarios they form are defined. Here, a scenario is formed in the upper right corner of the matrix, in which both uncertainties materialize, and correspondingly, in the lower left corner, a scenario in which neither occurs. The other two points are intermediate forms as shown in Figure 6. (Hänninen, 2023)

Figure 6. 2x2 scenario matrix (Research Gate, 2019).



Scenario options can be evaluated in different ways. Table 1 below assesses the strategic and financial relevance, difficulty of execution, risks, and management/ownership approval of the different strategy scenario options. The method helps to understand the big picture better and makes it easier to compare different options from different perspectives. (Grundy, 2003, p. 19)

Table 1. Evaluation of strategy options. (Grundy, 2003, p. 19)

Options / Criteria	Option 1	Option 2	Option 3	Option 4
Strategic attractiveness				
Financial attractiveness*				
Implementation difficulty				
Uncertainty and risk				
Acceptability (to stakeholders)				

* *Benefits less costs – net cash flows relative to investment*

3.2 SWOT analysis

The term SWOT analysis comes from the wording *strengths*, *weaknesses*, *opportunities*, and *threats*. The model was introduced in the 1970s by Kenneth Andrews but is suspected to have been originally developed by consultant Alfred Humphrey in the 1960s. Today, analysis is used in strategy planning as well as in other situations where the company's internal resources and the development of the operating environment must be considered. Viitala and Jylhä divide the quadrant into sub-entities, where strengths and opportunities help achieve goals and in opposite weaknesses and threats complicate them. Strengths and weaknesses are treated as internal and, correspondingly, opportunities and threats as external factors. This is shown in Figure 7. (Viitala & Jylhä, 2019, chapter 2 “SWOT-analyysi”).

SWOT is a synthesis analysis. The tool is used to form an overall picture of the company's situation to support strategic choices. To make a good quality SWOT analysis, knowledge of the company's resources and operating environment is required. The analysis works at its most effective if it is used to highlight a few key themes. (Vuorinen & Huikola, 2023, p. 47)

A good SWOT analysis is not just a list of issues, but it also focuses on solutions for them. Solutions should be linked to the company's strategy. Strengths should be developed, weaknesses prevented, opportunities exploited, and threats eliminated. (Hesso, 2015, pp. 72–73)

Figure 7. SWOT analysis. (Adapted from Viitala & Jylhä, 2019, chapter 2)

In a SWOT analysis, internal and external resources should be examined from different perspectives. Strengths can be evaluated through competence, resources, and success, or through positive feedback, development, and people's trust, for example. Weaknesses are deficiencies in skills and resources, as well as failures and things that do not work well. They are also development needs, evaluation of critical feedback and inability to respond to wishes. In the assessment of external factors, opportunities are created by positive trends, changes in customer wishes and behavior, the ability to respond to the activities of competitors and new things in the operating environment. Problems in the operating environment and issues that should be avoided must be considered as threats. In addition, technological, legislative, and other obstacles and difficulties must be prepared for. (Viitala & Jylhä, 2019, chapter 2 “Toimintaympäristön analysoinnin malleja”)

3.3 Environmental analyses

The analysis of the operating environment identifies incidents, development, interdependencies, and emerging phenomena that may have significance for the future of the studied topic or organization. When the operating environment is examined, by grouping and structuring topics into manageable entities the interdependencies between different factors are easier to understand. (Dufva, 2022, p. 105)

Environmental analyses are one part of strategy work. They are needed to understand the operating environment and how different factors affect business. Environmental analyses are macro-level analyses that include demand, customer, industry, and competitor analyses as well as weak signals. The challenge in carrying out environmental analyses is to find the right

information and be able to analyze it so that you can make the right kind of syntheses. For example, the PESTE analysis, in which political, economic, social, technological, and ecological environmental factors are assessed, can be used for implementation. (Kamensky, 2015, pp. 52–53)

Weak signals can also be utilized as a source of strategy work. They refer to the first symptom of change and a sign of an emerging issue (Dufva, 2018). In his book Corporate Strategy (1965), Igor Ansoff (1918–2002) described weak signals as part of strategic management. He defined weak signals as threats, opportunities, and development paths with so many uncertainties that their impact cannot be assessed, but also stressed that these must be considered when planning the company's strategy. Today, weak signals are an essential part of future work and strategic planning. (Vuorinen & Huikola, 2023, p. 144)

3.4 Risk management and evaluation

To ensure the implementation of the strategy, risk management is important. When planning the strategy, a risk analysis and contingency plans should be made. The significance and probability of risks are assessed on a scale of 2–5 for the main points of the strategic architecture. The risks are compiled into a risk map, which can be used to draw up a contingency plan so that there is an action plan to prevent and handle the realized risks. (Kamensky, 2015, p. 73)

Risk management involves the risk process planning, identification, analysis, mitigation or correction of risks, and monitoring of them. The plan defines roles and responsibilities, risk management criteria, reporting, tools to be used, resources and operating methods. In identifying risks, the aim is to identify potential risks that may cause cost, schedule, or implementation problems. Risks can be identified in various ways, such as environmental analyses, background studies, as well as through expert interviews and workshops. Risk analysis is used to assess the likelihood and significance of the identified risks, as well as the impacts they could cause. The impacts are assessed from the perspectives of different functions, such as product development and procurement. For each risk identified and analyzed, it is decided during the mitigation and correction phase whether to accept the risk with its consequences or to eliminate it or reducing the risk so that its likelihood or effects are reduced. Risks must be monitored and reported regularly, and changing circumstances must be considered, in which case risk factors may change or become more common. The risk management process is shown in Figure 8. (Department of Defense, 2017, pp. 25–42)

Figure 8. Risk management process (Department of Defense, 2017, p. 25).

Risks affecting strategic objectives should be assessed when planning and managed when implementing the strategy. From the perspective of strategic risk management, it is important to be able to assess, for example:

- Implementation of the strategy in terms of time and content, including the success of related development projects.
- Management model for strategy implementation and organization related to change.
- The correspondence of products and services to the customer's expectations and needs, as well as the ability to create new needs and demand in the market through new products and services.
- The organization's ability to identify and analyze, refine, and implement new business opportunities and innovations to support its strategy and achieve its goals.
- The organization's ability to monitor markets and competitors and adapt its own operations accordingly.
- The organization's capability to systematically manage customers and suppliers so that interfaces remain satisfied and suppliers efficient.
- Ability to react to cyclical fluctuations in the economy.
- Regular monitoring of legislation, policies and official activities affecting business operations.

- Ability to operate and grow in an international environment, considering the political, legislative, and cultural differences of different countries.

(Suomen Riskienhallintayhdistys, n.d.)

4 Product portfolio management

A product is a tangible or intangible saleable entity that remains identical or very similar throughout its life cycle. Tangible products are often physical devices and intangible products are for example software or services. Product portfolio management aims at maximizing efficiency and the ability to react to the behavior of products and services in the market throughout the product life cycle. The product can be considered to behave like that of any living organism: It is born, matures and eventually dies. A prerequisite for success is that the company develops and maintains its products efficiently at different stages of their life cycle. (Hannila, 2019, pp. 53, 56)

Product portfolio management is directly linked to business strategy, since the chosen directions affect, what products a company must sell and how it uses its resources. The selection, prioritization and suspension of product development projects is part of the work that guides the company towards achieving its strategic goals. The portfolio may also include products that are more strategic than financial in terms of the overall offering, in which case, for example, a more comprehensive product offering to customers can be achieved. (Hannila, 2019, pp. 57–60)

The existence of a product is characterized by its life cycle and related stages. Two challenges have been identified in the life cycle phases: replacing old products with similar new ones and the ability to respond to market needs, technological trends, thus achieving competitiveness. New products play an important role in the attractiveness of a company, even if they are not always successful. Lack of success may be due to mis-valuation of the market, poor design of products, launch of the product at the wrong time or positioning in the portfolio incorrectly, too high price, product development costs are higher than before, or competitors can meet customer needs better with their own products. For these reasons, the company must understand the market, consumers, and competitors, and utilize customer needs when designing new products. Before developing a new product, the target market, product requirements, features, and benefits must be precisely defined. (Hannila, 2019, pp. 56–57)

Effective product portfolio management requires means to be able to make the right choices so that resources in development and maintenance can be used as efficiently as possible. Gartner's publication lists 6 points that should be identified and considered, especially when managing a digital product portfolio:

- Work and constraints: To improve portfolio performance, it's important to proactively identify and remove potential constraints.
- Prioritizing according to customer needs and expectations: In strategic planning, it is important to define internal and external customers and form stakeholders from different functions who can form holistic decisions regarding prioritization and optimize limited resources as correctly as possible.
- Agile resource management: Resources must be able to be adapted based on market changes and changing customer needs. To this end, risks and priorities should be identified and managed as comprehensively as possible.
- Continuous value proposition: It is important to evaluate among stakeholders that the defined value proposition is being fulfilled. This requires continuous dialogue between stakeholders and, if necessary, prioritization according to customer needs.
- Building a culture that supports change: Digital transformation leads to changes in business and technology that can impact customer and employee experiences. It is essential to know how to handle change productively and manage it correctly.
- Continuous implementation of benefits: As digital business evolves, performance measurement and effective portfolio management are important. Mistakes must be analyzed, and lessons must be learned. Understanding customer needs, knowledge of market conditions and risk management should be mastered.

(Gartner, 2021)

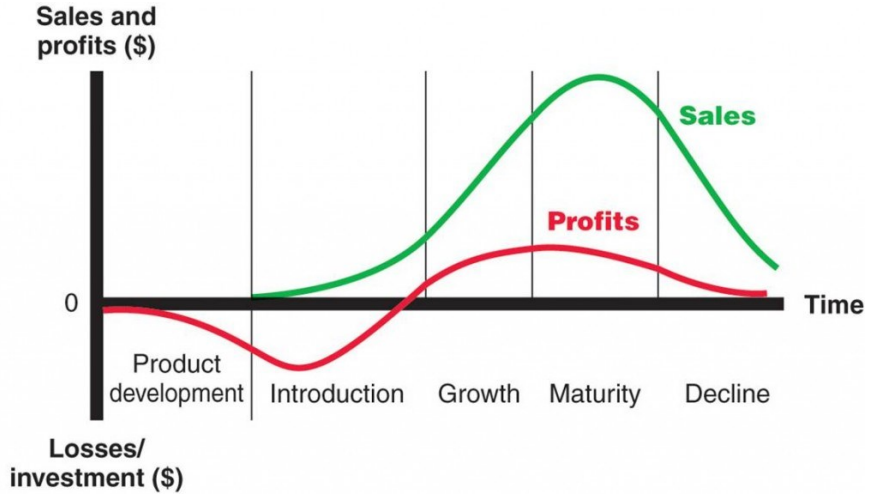
4.1 Stages of the product life cycle

The stages of the product life cycle can be divided into five different parts as shown in Figure 9:

1. Product Development stage: The creation begins. At this point, there are no sales, and the company invests in product development.
2. Introduction stage: The product is introduced to the market. Revenue is not yet generated.
3. Growth stage: The sales of the product increase and profitability rises.
4. Maturity stage: The sales growth slows down and eventually reaches its peak. Profitability is reduced because efforts are needed to defend competition.
5. Decline stage: The Sales slowdown fast and eventually stop altogether.

(Mital, 2014, pp. 13–14)

Figure 9. Stages of the product life cycle (Claessens, 2015).



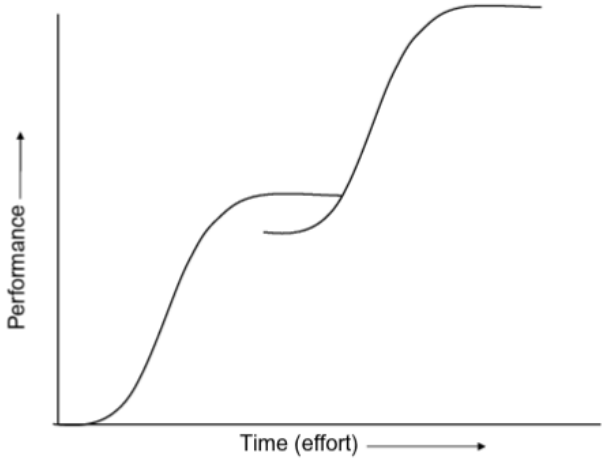
In the growth stage, the goal is to maximize market share. The increase in sales will attract more competitors to the market. This intensifies competition and the market expands. Company must invest in product quality, add new product features, and invest in product marketing. At this stage, product lifecycle strategies are interrelated and often there is a need to make a choose between high market shares or high current profits. By investing in product improvements, marketing, and distribution, it is possible to gain a dominant position. However, this often requires giving up current profits and believing that they can be achieved in the future. (Claessens, 2015)

At the maturity stage, the main goal should be to maximize profit and defend market share. Sales growth of the product slows down or evens out after reaching its peak. The maturity stage is often significantly longer than the previous stages. At this stage, good life cycle management of the product is required. The slowdown in sales growth is due to many factors. There are many similar products on the market, which leads to increased competition and the elimination of the weakest ones. Even during the maturity stage, the product must be able to be improved and developed to remain viable and competitive. (Claessens, 2015)

The goal of the decline stage is to reduce spending and "milking" the brand. Prices are often cut, distribution and advertising are reduced, and the focus is on managing existing customer relationships. In life cycle strategy the products in the decline stage must be identified in a right time and a decision must be made whether they are wanted to be maintained or ramped down. If the product is to be revived, the aim is to get it back into the growth phase. Removing a product from the portfolio can also mean selling it to another company. (Claessens, 2015)

From the perspective of product lifecycle management and technology development, it is also important to understand the S-curve, which describes the behavior of technology evolutions (Figure 10). The curve can be divided into three parts, the phase of slow and rapid growth and the stage of flattening. At the first stage, growth is slow, after which it increases significantly, and at the end growth stops. From the perspective of utilization and timeliness of successive technology evolutions, company should react at the end of growth and update the technology to maintain the competitive advantage. (Mital, 2014, p. 15)

Figure 10. The S-curve of technology evolutions (Mital, 2014, p. 15).



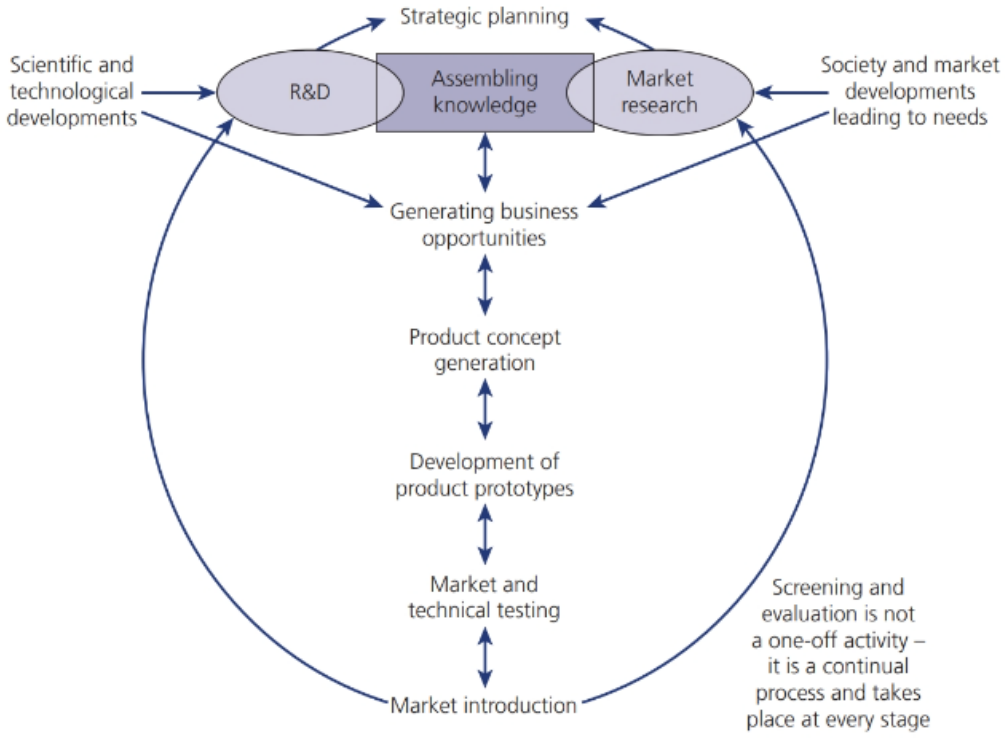
4.2 New product design

The concrete results of the strategy often lead to the design of new products. Business opportunities created through customer and technology requirements and market potential trigger product development projects. Based on the requirement specifications, a concept can be created, prototypes can be developed, and the resources needed for developing the actual product can be defined in more detail. Business potential guides the organization to decide whether to implement a product development project or not. The stages and dependencies of the process are shown in Figure 11. (Trott, 2021, pp. 492–493)

Developing a successful product is difficult and requires in-depth knowledge of both business and technologies. The product should be superior in value, distinctive in its features and deliver clear and unique benefits to the user. Understanding customer needs and markets should also be considered when designing a product. Before starting a product development project, you need to understand the market and its potential, technical needs, opportunities, and requirements. The more carefully the background work has been done, the more accurately it is possible to assess the potential of the product development project and its connection to the business. Requirement specifications are needed for the product, in which

the mandatory and desirable properties are defined in sufficient detail and the corresponding implementations of competitors have been evaluated. (Mital, 2014, pp. 23–25)

Figure 11. The process of designing a new product (Trott, 2021, p. 493).



The success of the project can be assessed from the perspective of costs, quality, time spent on development and competence development. A project is successful if the cost of the product reaches or remains below the set cost level and the product development project keeps its' budget. The success can also be measured in terms of project duration and keeping the schedule. The sooner a company can launch new products on the market, the better the competitive conditions will be. The product must also comply with the set quality goals. In addition, the learning ability of the product development organization as the project progresses and thus the development of competence must be assessed. (Mital, 2014, p. 22)

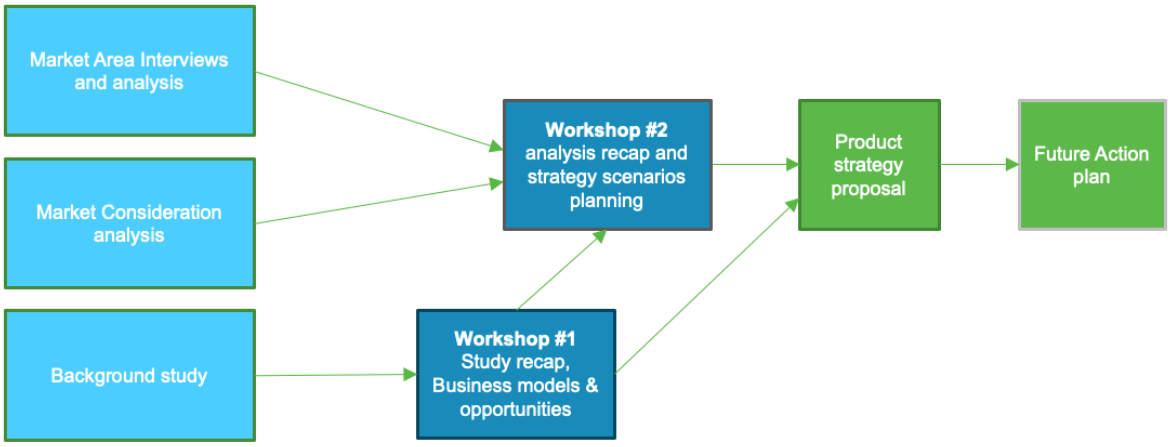
A technology-driven approach to product innovation can help companies target and lead market segments, establish themselves as an industry standard, build a positive reputation, anticipate the future direction of the industry, and create successful business. This can be a key part of a company's strategy, but it is also expensive and risky. The approach requires significant investment from the company in the development and commercialization of new technology. To succeed, a company must ensure that business and technology strategies are firmly integrated. (Trott, 2021, p. 467)

5 Research

In the research phase of the thesis, an interview survey was conducted. It mapped the current state and future needs from a business and technology perspective. The study was carried out as a qualitative interview survey with different stakeholders. The interviewees included people from around the world representing sales, service business and product business unit.

In addition to the research carried out in the thesis, a background study was previously carried out. That was utilized as part of the strategy work. In this background study, some of the same topics were mapped as in the interview survey. In these two studies the interviewees were not the same persons. In addition to the background study, a competitor and market survey was carried out. That charted the business position compared to competitors and business potential. All three studies mentioned above were carried out separately from each other, but in the analysis phase all the results were used in the strategy process. Two workshops were organized to analyze these and prepare further plans, based on which a business and product strategy proposal was made for approval by the management team. The whole is illustrated as a process in Figure 12.

Figure 12. Research process.



In defining the research question, attention was paid to the two above-mentioned contexts: product and business strategy. The aim was to find out the current state and future intent or its various alternatives. The research questions from a business strategy perspective were:

- How can product sales be increased in the business area?
- What are the most significant factors that influence the customer's purchase decision from a product perspective?

Correspondingly, from the point of view of technology strategy, the research question was:

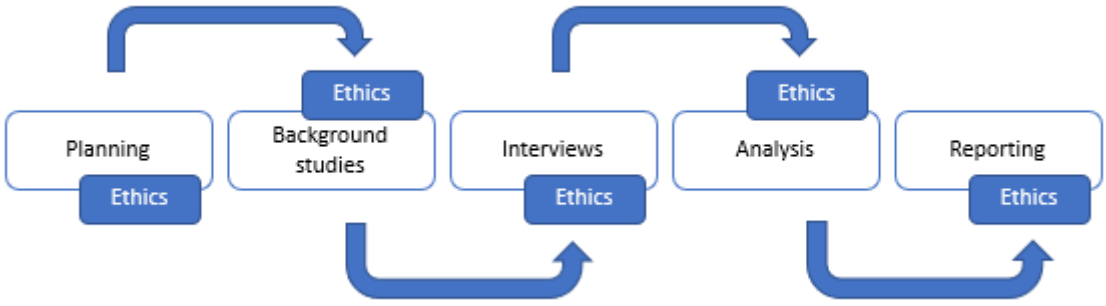
- What features and technology requirements are set for the of a new product so that it meets customer needs the best as part of the company's product portfolio?

The research questions were formed together with the management so that they supported the company's strategy and goals. It was essential to understand where the growth potential is, what the customer wants to buy, and what requirements the customer places on the product. With the help of these, the development needs of the product and its business connected to the company's portfolio were identified.

5.1 Theory of research method

Scientific research proceeds in stages as shown in Figure 13, starting from the development of the idea to the selection of the research topic, the preparation of the research plan, the collection and analysis of the data, and finally the reporting of the results. Although the model below shows an ideal type of flow. In real the stages of the process interact with each other: the next stage can influence the previous ones, and the research idea can also change along the way. The work phases often overlap with each other, and questions of research integrity are present at each stage. Writing is an essential part of the process from start to finish. In qualitative research, the role of data is central, as it shapes the direction and nature of the research. (Tampere University Data Archive, n.d.)

Figure 13. Stages of scientific research (Adapted from Tampere University Data Archive, n.d.).



The qualitative interview survey used in the thesis is one form of qualitative research. The aim of the research interview is to produce information for the research problem. During the interview, the researcher asks questions and collects answers that form the material. The interviewer's questions and style affect what kind of answers are received. Interaction in the interview situation is part of the data and its analysis. The researcher makes choices in the

planning and implementation of the interview, such as preparing questions and organizing the interview situation. There can be different types of interviews, such as structured or semi-structured. They can be conducted for different purposes, such as expert interviews, group interviews or narrative interviews. (Tampere University Data Archive, n.d.)

5.2 Interviews and processing of data

The research was carried out as a qualitative interview survey with a total of 21 participants (Table 2). The number of interviewees was 2–3 people per sales area (6 sales regions), as well as some other key people specializing in product sales, business, and technology. The persons were selected so that the persons in charge of the organizations were asked to name people familiar with the subject in their area. The background and objectives of the study were explained with the help of support material, based on which they were able to select suitable people for interviews.

Table 2. Interviewees by region / organization.

Organization	Persons interviewed
Asia sales & service	3
China sales & service	2
Central & Southern Europe sales & service	2
North America sales & service	2
North Europe sales & service	4
Product group	4
Valve business line	2
TOTAL	**21**

The interviewees were prepared by sending them background material in advance. It described the objectives and purpose of the study, as well as the research question. In addition, they were informed about the anonymous implementation of the study and how the data is managed. The material also included interview questions derived from the research questions. The research interviews were conducted over a calendar period of approximately one month in February–March 2024.

Before the interviews began, the interview questions were derived from the research questions in a small workgroup. The questions were divided into two different areas, one focused more on the business and sales of the product and the other on technology. The headings of business- and product-oriented topics were selected based on what was wanted to be asked, for example, related to growth or customer needs. The aim was to formulate the questions in such a way that it was known that the interviewees had the ability to answer

them comprehensively, but also so that they support strategy work as well as possible. The questions formed related to sales and business were:

- Growth: What new business opportunities are there in different business sectors in the regions?
- Marketing and sales: How is the product marketed? What arguments are used to sell the product? What is a contract model for sales?
- Customer needs: What kind of needs do our customers have that we can or cannot meet?
- Expertise: Does the region have sufficient expertise to sell and deliver the product? How should this be developed?
- Customer satisfaction and feedback: How is customer feedback collected and utilized? How can customer satisfaction be improved?

The questions related to the product and technology were:

- Efficiency: How can operational efficiency be improved, and costs reduced? Can technology be utilized here and, if so, how?
- Customer needs: What kind of technical needs do our customers have that we can or cannot meet?
- Product features and life cycle: What product features can be improved? What changes are required to meet customer needs?
- Product management: Does the current product portfolio make sense? Could it be optimized by adding or subtracting products? On what basis the choices should be made?

The interviews were held partly face-to-face and mostly remotely. There were no participants in the interview situations other than the interviewer and the interviewee. The duration of the meeting was about 45 minutes. The interviews began by reviewing the background and role of the interviewee and the interviewer and reviewing the purpose and background of the interview survey. The questions were gone through in order, and each participant was able to answer the questions they knew and wanted.

Free-form notes were made of the interviews, which were analyzed. Based on them, a grouped summary of the current state and needs of different areas and market areas was made. To be able to take enough interviewees it was decided not to record the interviews. Transcribing the recordings and thus further analyzing them would have taken too much time. This course of action was a conscious risk for the study, but it did not realize. Based on

careful notes, the material was comprehensively analyzed. The data were compiled into a matrix in which each individual question was examined as a whole and at regional level. Based on this information, further analysis was carried out as part of the strategy work.

Qualitative interview research was chosen as the research method because it was estimated to produce the highest quality data for this purpose and best suited to the case in question. As this was a global study, the aim was to achieve one-on-one interaction to obtain high-quality answers and to be able to take cultural factors into account. The use of qualitative interview research can also be justified with the aim of understanding experiences and gathering deeper understanding at the individual level, as well as the possibility to supplement questions with additional questions in interview situations and explain them if the respondent did not understand all.

Since knowledge of the product is still relatively low in the organization, people who knew enough about the topic wanted to talk face to face. The choice of method was also influenced by previous experiences in the organization that there are not enough quantitative responses to a survey in which material is collected using questionnaires. In addition, the responses to surveys are often quite poor quality. The reliability of the results has been assessed in chapter 5.7 and the processing of the data is described in Appendix 1, Thesis data management plan.

5.3 Analysis of market and competitor analysis and background study

In addition to the interview survey, a market and competitor analysis was carried out. It was made by using analytical tools. The work was carried out by a specialist of the company. The results of the market and competitor analysis were later utilized in strategy work. The analysis focuses on the following points:

- Market analysis: What is the market for the product? How is the market developing and how can it be utilized? What kind of growth opportunities does the market offer?

- Competitor analysis: What competitors there are? How do we position ourselves in the competitor field? In which industries do competitors operate and how do they rank in them? What is the competitors' product offering and what advantages do competitors have compared to others?

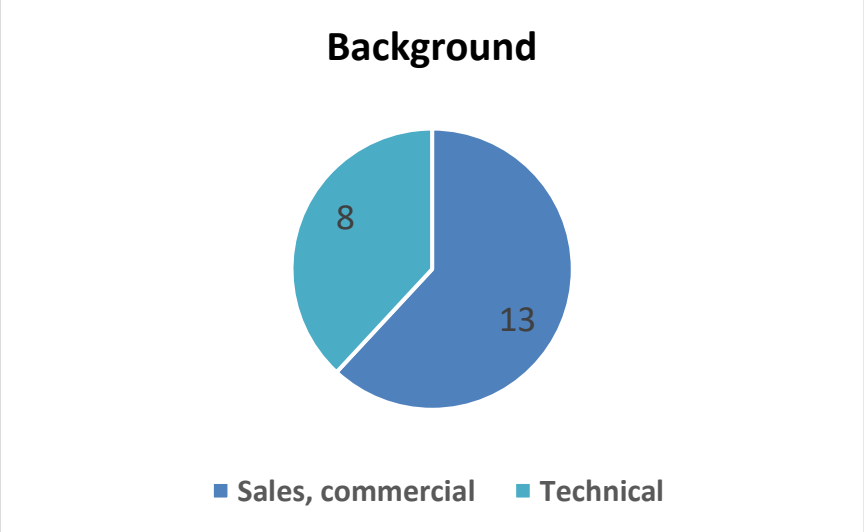
Earlier in the previous year, the company also ordered an external background study, which included research related to the product's technology and business. The results of both,

market and competitor analysis and background study are analyzed in chapters 6 and 7. They have been used as material in strategy work, but they are not part of the research carried out within the scope of the thesis.

5.4 Analysis of interview survey data

This chapter analyses the results of the thesis interview survey. Before the actual interview questions, the interviewees were asked to tell about their background. Some of the persons had a more commercial background and some a technical background. Figure 14 shows the people's own view of their own area of strength. 13 of the respondents had a more commercial background and 8 of the respondents had a more technical background. However, several people had understanding and competence in both topics, but they were asked to choose what they thought was a stronger area. The respondents' background can be considered to have influenced their ability to answer questions in different areas. In general, it can be said that the answers to the more technical questions were quantitatively less detailed than to the commercial ones, but nevertheless all questions received comprehensive information. The emphasis on the commercial side was deliberately slightly higher, as the respondents included more sales representatives from business areas. Technology and background of the product had already been studied quite fundamentally in the previous background study. However, the interview survey confirmed and refined the findings well.

Figure 14. Technical and commercial background of the interviewees.



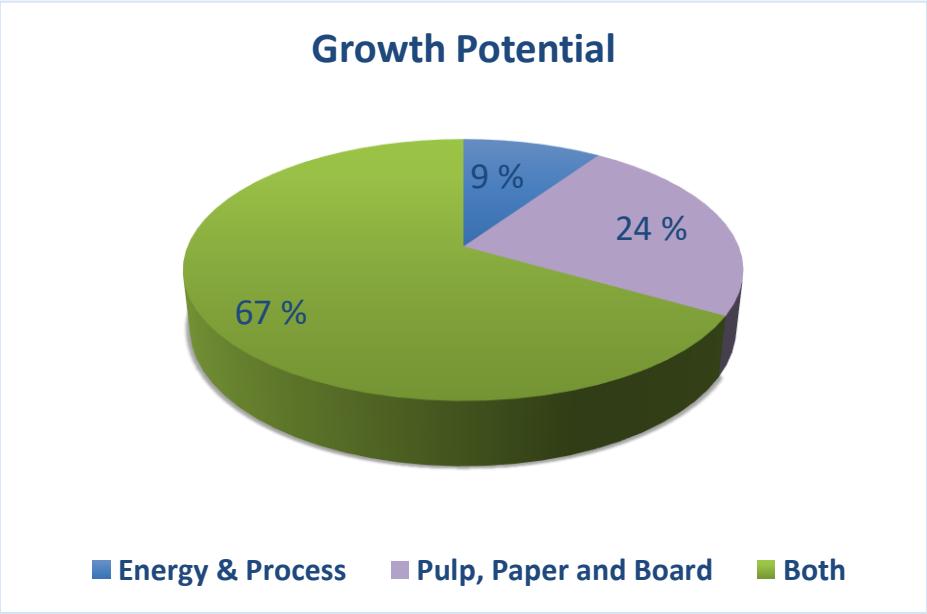
The questions listed earlier in chapter 5.2 are analyzed in the following paragraphs. The analysis of the research results has been carried out by sub-area and partly also according

to the question of the perspective of geographical areas. The research work was utilized in business and product strategy work.

5.4.1 Growth potential

The interviewees were asked what new business and growth opportunities the product offers? In the history of the product, it has mainly been delivered as a *stand-alone* product, but in the current operating environment, the extensive automation product offering increases potential for selling to the same customers as part of the other product and service offering. Almost all responses highlight the growth potential of the pulp and paper business, but also other industrial segments the company operates in. The responses also highlight the importance of the existing installation base. Growth potential through the current installation base should be sought systematically by approaching selected customers from different geographical areas. Especially opportunities are seen in automation system customers. In the business areas, opportunities for non-current volume customer segments (e.g. oil and gas) were considered rather limited, although in a few cases possible. Figure 15 shows the percentage distribution among respondents who mentioned pulp and paper, energy, and process industries, or both. Thus, two-thirds of the respondents agreed that both business areas have growth potential. The responses may be polarized in this respect depending on the person's background and the business areas represented by their clients, but the picture shows that growth potential is seen in all the company's core customer segments.

Figure 15. Growth potential by business area.



Only two of the interviewees raised the issue of setting sales targets for the product. The interviewees were not specifically asked about this topic. One interviewee told about the

sales targets set for him in the business area for the current year. The targets were set in euros and the quantity of new sales orders. Another interviewee who has worked with product sales for a longer time said that, in his opinion, growth has not been sought very much in recent years from the perspective of goal setting.

Based on the responses, cooperation with the valve business and the internal utilization of the product is not very systematic and strong. There are, of course, some regional differences. The cooperation has significant improvement potential both from the perspective of improving customer performance and from the perspective of monitoring and diagnostics of own products as part of the service and maintenance business. The internal pricing model and method, which should be made easier and part of the same tools as other products, were raised as issues.

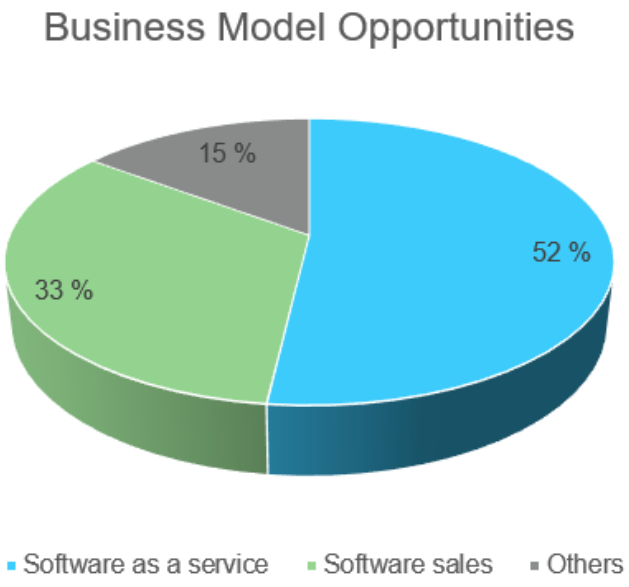
The answers to the question about global growth potential were surprisingly similar regardless of geographical area or business focus. The interviewees saw the most growth opportunities in the pulp and paper business as part of other automation products in the same installation base that already has other products or processes supplied by the company. The responsibility for product sales and delivery has started to be shifted from the product team towards geographical sales and service organizations, which enables higher volume in customer contacts, better knowledge of individual customers, and thus increases opportunities for product revenue growth. The motivation to increase volume in the areas was well expressed in the interviews.

5.4.2 Product sales and marketing

In relation to product sales and marketing, the interviewees were asked how the product is sold and with what arguments, as well as what kind of contract models are used. The responses from different respondent groups were very similar, although there were individual differences depending on the respondent's background. The product's business is divided into product and service sales depending on the customer, customer segment or business area. Paper and pulp customers want services whose pricing is based on results. In other customer segments, customers can purchase a software product under a fixed license (perpetual) and have their own experts who use the product, or they purchase the necessary services as an addition. However, even in these customer segments, according to the interviewees, there is a shift towards growing performance-based contract models and service business.

A significant part of the success of sales projects was that the customer has a sufficient understanding of the product and its possibilities of use. With better support documentation and sales and delivery references, it is also easier to communicate this to customers in a sales situation. Figure 16 breaks down the percentage distribution of which business models the interviewees saw as having the most potential. The software as a service business model, which is most results-based, was considered to have more potential than software sales, where software licenses, initialization and configuration services and user training are sold, after which the customer uses the product according to their own will. Other contract templates are summarized, such as intercompany sales and various analysis services for which the product in question is used, but not delivered to the customer.

Figure 16. Opportunities of business models.



One of the challenges of sales projects highlighted in the interviews was the lack of good references and sales material. Business areas want support material that can be presented to customers as success stories related to product use. Customer value cannot be sufficiently emphasized with concrete examples without good support material, because expertise and references in individual areas are still largely limited. Since customers want to focus on results and performance-based contract models, sales would also be boosted by concrete demo and trial periods, where customers could install a test environment in a real process at a minor cost. This would give them chance to see the opportunities offered by the product in their own operating environment. Six people highlighted the need for demo and trial periods.

The product structure and its pricing model were seen as inadequate, as the product has no modularity at all. This means that product pricing is based only on the size of the customer

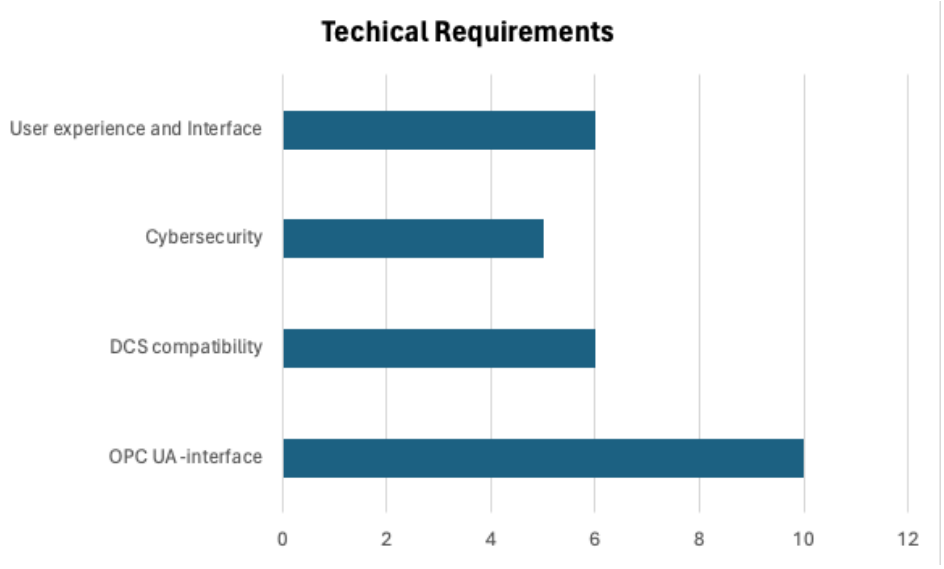
process and the quantities in it, and not at all on the desired or necessary features. With the current product, modularity, where you could choose the desired features from different options depending on the use case and need, is not possible and requires significant changes to the product. For the customer, the initial investment with the current model is often too high, but modularity or an otherwise different pricing model could alleviate this and thus lower the investment threshold.

Today, the product is mainly sold as a single product and not as part of a larger product entity and portfolio. In the interviews, it was pointed out that a clear sales strategy for this sales model does not exist, or at least it has not been brought up. As part of a larger offering, there is potential for broader argumentation in customer value creation related to integration with other products and equipment and processes supplied by the company.

5.4.3 Technical characteristics of the product

At this point, the interviewees were asked: "What kind of needs do our customers have that we can or cannot meet?" and "What product features can be improved? What changes are required to meet customer needs?". Figure 17 shows the most frequently encountered response options. These included the lack of OPC UA interface and data security, DCS compatibility, and shortcomings in user interface and usability. OPC UA is a communication protocol developed by the OPC Foundation based on the IEC 62541 standard, commonly used in industrial IT/OT systems. (OPC Foundation, n.d.). DCS (distributed control system) compatibility here refers to the connectivity of the product to any industrial automation system. OPC UA interface was mentioned by 10 respondents, user interface and DCS compatibility by 6 respondents, and cybersecurity deficiencies by 5 respondents.

Figure 17. Technical customer requirements.



Almost all respondents pointed somehow to shortcomings in connectivity, especially the lack of an OPC UA interface was highlighted. In addition, the topic of connectivity includes interfaces with other systems (e.g., ERP, Enterprise resource planning and MES, Manufacturing execution systems) that were highlighted in some interviews. Several respondents also pointed out how connectivity and integration with the company's own automation system product should be smoother than with other vendors' systems. In addition, this should provide a competitive advantage in terms of cost and features that are not available with competitors' systems. However, the product must be able to be connected to any commercial automation system using common interface protocol (e.g., OPC UA).

The greatest technical strength of the product was seen in calculations, algorithms and other technical features that make it excellent compared to competitors due to its versatility. Unfortunately, an outdated user interface significantly degrades the UX (User Experience). In addition to connectivity, the development of the user interface and usability was seen as the most important development target. The modularity mentioned in the previous paragraph was also highlighted in technical features. In the opinion of most interviewees, the product should be divided into parts so that there is a basic package and 2-3 separately priced additional packages, with simple basic tools and additional packages related to reporting and analysis, suitably selected, and grouped from the portfolio of the current product.

Information security was also significantly emphasized in the response options. The protocols used for the connectivity of the current product and their technologies are difficult to meet today's industry requirements, although more interviewees also mentioned that security deficiencies are not very often raised up in the customer interface, especially among existing customers. Today's industrial requirements for software are largely set by the IEC 62443 standard, which in practice often means at least SDLA (Software development lifecycle assessment) and SSA (system security assurance) certificates. In addition, the CRA (Cyber Resilience Act), which will soon enter into force in the EU, also sets additional requirements for software products delivered to industry.

Other shortcomings related to technical features included lack of support related to batch controls and certain equipment types, which could contribute to the growth of the maintenance business in the valves business line. Cloud computing integration in certain applications from the perspective of more complex computing and the management of larger factory and installation entities was also highlighted, as well as the lack of more agile tools for customizing and configuring customized reports and analyses.

5.4.4 Know-how

There are major differences in competence between regions and organizations. This is because the business of the product has been carried out in some areas for a long time and in some areas the product is completely new. When the product became part of the automation system business, expertise began to be decentralized from the previously centralized organization to the regional sales and service organizations a few years ago. Some of the experts previously in the centralized organization were transferred to regional organizations at the same time, which partly affects the ability and capacity of certain regions to sell and deliver better now and is also reflected in the interview responses.

The interview question here was whether the respondent felt that the organization he represented had the ability to sell and deliver the product. The product group has a long history of product sales and delivery, which means that its expertise is clearly the strongest. Of the business areas, the strongest competence capabilities are in North America and Northern Europe, followed by South America and Central and Southern Europe, China, and Asia. In some of these areas, sales and delivery of the product can be handled completely or almost completely. Some tasks, such as product pricing, require the support of the product group.

The capacity of sales support was brought up in several interviews. It was highlighted as being of very high quality but limited in capacity. The availability of sales support and the product group's technical team was seen as problematic in some regions, if only because of the time difference. In China and elsewhere in Asia, delivery capability is the most limited. This is understandable, as the first customer projects are being delivered in these areas. However, all regions, especially in the sales phase, strive to take care of their customer front themselves, even if technical background support is needed from the product group. Table 3 presents a rough competence matrix by business area. In it, the green color describes a good general situation and an independent ability to act from the perspective of sales and customer deliveries. Similarly, yellow represents limited capacity. In all areas, the trend of competence is growing and, according to the interviews, the motivation to increase it is high.

Table 3. Sales and delivery capability expertise by business area.

Market Area	Competencies	
	Sales	Delivery
China		
North Europe		
Central – South Europe		
Asia & Pacific		
North America		
South America		

The regions have been trained in previous years and efforts have been made to increase their competence. In addition, internal competence certification training program for the product is currently being built. Several interviewers highlighted the limits of global and regional delivery capability if the workload becomes very high. Awareness raising was also mentioned in many interviews. The existence and possibilities of the product should be marketed as additional sales alongside other deliveries, and opportunities should be considered in which the product could be of help to technical personnel of certain groups in their own operating environment.

5.4.5 Customer feedback and satisfaction

The interviewees were asked about their experiences, what kind of customer feedback had been received and collected, and how customer satisfaction could be improved. Customer feedback revealed that it is only collected systematically from trainings. In addition, sometimes in the past events were organized for product users to share customer experiences. Otherwise, none of the interviewees knew that customer feedback or satisfaction would be measured at all. At least the interviewees are not aware of the feedback. However, customer feedback and references were considered very important. In many areas, the first customer deliveries are ongoing, and getting good references would significantly boost sales. The target would be to share these success stories and feedback internationally between different regions so that it would support business growth. Only one interviewee mentioned that customer feedback is collected systematically.

5.4.6 Product management and portfolio

The respondents were not able to comment very comprehensively on the product portfolio or its management. This may be partly because product management responsibilities are not clearly defined between different roles. In addition, product-related product management expertise is in the hands of very few people. It was mentioned that pricing was partially deficient and that some prices were missing from the sales tool. Here too the ability to utilize the modularity of the product, which has already been discussed in previous paragraphs, was highlighted.

Extensive comments were received on the product portfolio and that 80 sub-products (analysis/reports) were too many. Most of the respondents would weed out some of them. In this context, the respondents were asked for their opinion on the number of sub-products needed for at least the first version of the new product. The quantity varied between 15 and 60 sub-products. The responses clearly highlighted the fact that the number of sub-products needed by oil and gas industry customers is higher than paper and pulp customers. This can be attributed to the fact that some of the sub-products have been built specifically for the needs of the oil and gas industry and because the business has been conducted in this customer sector for a longer time. That means that product's maturity in oil and gas is higher. A few experienced interviewees, who felt they knew the product well also pointed out that some of the sub-products were too difficult to use and practically useless in their opinion. They said they did not understand the purpose of them or did not recognize the business benefit from the end user's point of view. The partially inadequate documentation of sub-products was also mentioned in a few interviews.

5.4.7 Internal utilization possibilities

Capabilities for utilizing the product in own use have begun to be built gradually in the organization. Significant potential is seen in assisting in the delivery of certain products and in monitoring the performance and operation of the delivered equipment. However, there is a lot to do in terms of cooperation and awareness-raising, as well as the opportunities and competence that come with it. The interviews emphasized the use of the product through examples to support different solutions. Potential is seen in deliveries where contract terms are tied to services and where product performance and resulting results are measured. In these, the product could be utilized as part of a contract model tied to performance guarantees, so that the contract terms of the delivery would be fulfilled as comprehensively as possible. This possibility was mentioned by 10 interviewees.

5.5 Summary of the research results

In the interview survey, the aim was to find out, with the help of set research questions:

- How can product sales be increased in the business area?
- What are the most significant factors that influence the customer's purchase decision from a product perspective?
- What requirements are set for the features and technology of a new product so that it best meets customer needs as part of the company's product portfolio?

Summing up the research results, we can say that the product has potential, and its brand is strong, but it is technologically outdated. Growing business opportunities are seen in all core business areas, especially in the pulp and paper business, as part of the company's other product offering, without forgetting individual customers. Cooperation with other business lines is also seen as an opportunity. Company should invest more in the result-oriented sales and build around service business rather than software product sales, as well as create sales models and documentation of successful customer deliveries as references. In addition, trial periods should be offered to customers. Product pricing needs to be renewed and the sales process needs to be clarified. It is hoped that licensing will be modular, so that the customer can choose a suitable package from the options and the investment threshold would be lower.

Product features, especially the user interface and user experience, should be significantly developed, connectivity should be improved and modernized, and attention should be paid to product cybersecurity. In addition to this, the attractiveness of the product should be improved with a few other improvements and features, and the rationality of the current product portfolio should be critically evaluated. Competence development and implementation should continue and, if necessary, increase the capacity of the global product group to support customer deliveries in the business areas. The measurement of customer satisfaction and the development of feedback must also be systematically implemented.

The interview survey broadened the understanding globally of the issues that were previously partially investigated in the background study (chapter 6). The results between the two are similar. It provided a broader overall understanding from a business perspective of where the company has growth potential and what it requires from the product.

5.6 Short-term opportunities

Although the product that is the subject of the thesis should be renewed, the research and other background material revealed opportunities that should be taken forward regardless of whether the product itself is reformed or not. Based on the interviews, areas that can be improved in the short term were identified: competence, sales process and materials, customer feedback and cooperation with other businesses. This chapter summarizes these items, for which an action plan and follow-up procedure should be created to move them forward.

Capacity and know-how can be invested in by increasing the availability and capacity of international sales support. Local expertise in selling and delivering should be developed, as well as starting a certified training program and continuing other training. The basic competence of the product and the possibilities of utilization in own operations should be emphasized, and successor and a competence risk management plan should be drawn up for critical roles in the product team. This work can be approached systematically by creating competence matrix of the current state by region, after which the objectives for competence development can be defined.

Product sales should be aligned with the same tools as the rest of the company's product portfolio so that processes and tools are the same. This makes it easier to operate on an individual level, as the way of working with all products is the same and there is no need to learn new tools and processes. Sales material needs references and success stories to support service sales. These must be centrally available in the same channels as sales materials for other products. In addition, clear annual targets must be set for the sales areas and monitored. The customer feedback process must be made operational, which also supports the collection and documentation of sales material and references.

Cooperation with other businesses can be increased. Systematic cooperation at the customer interface can open new business opportunities in the service business. Utilizing the product in customer deliveries to support other product and service deliveries is also seen as an opportunity.

5.7 Research integrity and reliability of results

The interviewees were selected from the business areas so that the local management selected the them. In this way, the interviewees could not be influenced, which contributed to the objectivity of the results. The quality of the interviews was a positive surprise. In the

study, the response results were well saturated, and most often many issues came up several times. For example, certain technological shortcomings were mentioned by almost all interviewees. In the interviews, I was also positively surprised by the openness in the answers, which had previously been a concern. All interviewees were very open about their opinions and the discussions were of high quality, and there were no cultural differences in the criticality of the responses, even though the respondents represented different countries and cultures. This improved the results qualitatively and increased the reliability of the study. I believe that transparency in the interviews was increased by the fact that as an interviewer I was unknown to many of the interviewees about the context of the business and the product. It means that the interviewer has not had a background in or influence on the business environment of the studied product. The reliability of the research results is also supported by earlier background study (chapter 6), which shows very similar results, even though the interviewees are different persons, and the study was carried out by an external party.

To guarantee research ethics, it was important to maintain the anonymity of the interviewees throughout the study and after it. The action plan for strategy work may affect organizational structures, responsibilities, and tasks, and therefore the opinions of individual respondents are not wanted to be expressed. All responses have been analyzed at question level globally or, in some cases, by business area. The processing of the data is described in the data management plan Appendix 1.

6 Analysis of the background study

The company ordered an external background study at the end of 2023 to review the current state of the product and use it to explore opportunities for further development. The survey reviewed the product, interviewed the management of the automation business, technical and commercial experts in the product group, and a few other individuals. A total of 10 people were interviewed. The results have been analyzed in a few different stages in the company. This chapter wraps up the findings of the background study. Together with the thesis interview research and market study, these materials provide a comprehensive basis for strategy work. This background study had a significant impact on the fact that the business and product strategy of the product, which is the subject of the thesis, was pushed forward more strongly.

The study covered product integration into the company's product portfolio, product vision and strategy, product management, customer insight and development, change management, and technology architecture and strategy. From all these topics, the main challenges in this chapter were analyzed and highlighted.

The challenge in fitting the product into the product portfolio was seen that the role of the product is unclear, and it is not clearly defined what business opportunities the product has as part of the strategy. Operational activities have been taken without further strategic planning. The common objectives and clarity of them are unclear. This creates a challenge in creating a common understanding and purpose among stakeholders. Although the goal is to increase turnover, the plan and means to achieve it are lacking. This makes it difficult to set specific financial targets.

The vision of the product was considered unclear. The product life cycle is in decline state, but there is no strategy for the future. Prospects are based on subjective views on a personal level rather than written and agreed plans. The lack of strategy has driven the product into a state driven by sales targets and customized solutions for customers. These often take precedence over long-term priorities, such as repairing technical debt. Within limited resources and capacity, achieving a balanced short- and long-term strategy is vital. Sales planning should be more closely linked to the overall product strategy and sales channels should be chosen sensibly: utilization of existing channels and effectively cope with the challenges of new markets. In addition, there is no clear sales target setting.

Competition was seen to have intensified, and competitors were seen to get closer in features, offer more affordable solutions, and be able to offer a more modern product. The

challenge is to stay ahead of innovation, cost-efficiency, and market image. Because resources are limited, the product team is very reactive in terms of day-to-day operations and opportunities to take advantage of new trends and technologies are often missed.

The lack of a product strategy to guide management decision-making and show the direction of product development, combined with a deficient customer feedback process, poses challenges, and the product has not undergone significant development in years, but rather minor improvements. Due to insufficient feedback, the product team does not have accurate information about which features customers use and need the most. The product is extensive in size and structure, and the software structure is very difficult to understand. To understand it, you need deep knowledge of the product. The technologies used are not modern and the commenting and documentation of the software code is incomplete or absent.

The product management and development team are understaffed. In recruitment processes, it is challenging to find people whose skills meet the need. A geographically distributed team is difficult to expand, and the time difference poses challenges in communication within the team. The ways of doing things are completely different from the company's other product development processes, and responsibilities within the team are not clearly defined. The product's technological expertise depends on individuals, and succession planning, or related risk management have not been comprehensively carried out.

Organizational changes, where the product management and development team has historically been moved from one location to another, combined with insufficient resources, have had a significant impact on the motivation of the core team. This has eroded trust within the team and created uncertainty about the future direction of the product. Addressing these challenges is seen as important for revitalizing the team and fostering a culture of innovation. You need a plan that integrates the team closely into your current business, both at the operational and strategic levels. Software development processes are old and need to be adapted to the agile methods used by the rest of the company's product development organization.

There are a lot of technological challenges associated with the product that require changes. The most critical were the technologies in use and operating system incompatibilities. The life cycle of these has ended years ago. This causes reliability problems with the operation of the product and requires a lot of maintenance. Outdated connectivity technologies combined with non-secure access protocols increase security risk. Shortcomings in modern connection

methods and user interface, customizability and integration into the automation system were seen as inadequate features.

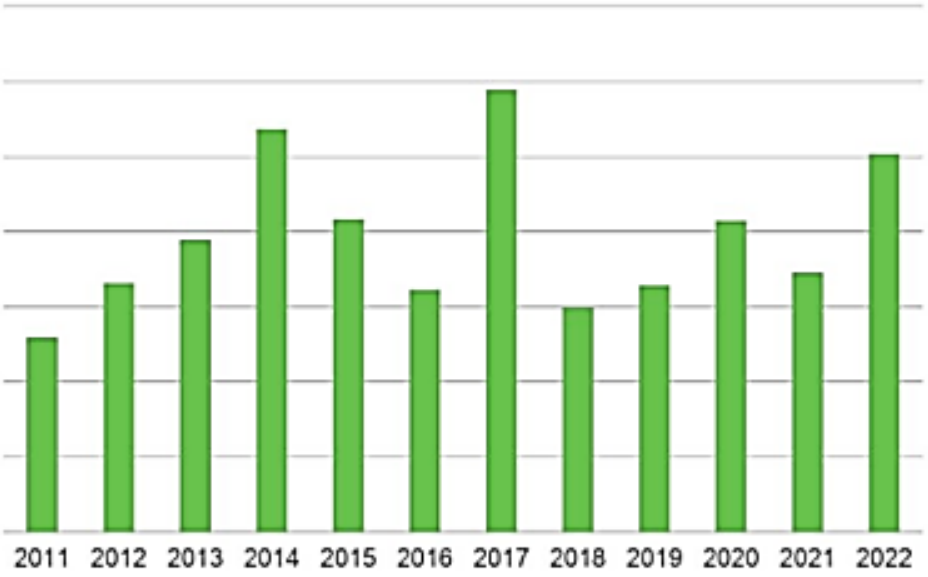
The persons interviewed in the background study and its authors were different from the interview survey conducted in the thesis. Nevertheless, the issues raised are largely the same or complementary. This increases the reliability of both interviews.

7 Analysis of competitor and market survey

In parallel with the thesis research, a competitor and market survey were conducted for the product, analyzing the current state of the product's business, market potential, the company's position in the market and competitors. According to Hannila (chapter 4) to be successful in business you must know the market and competitors well. This chapter analyses the most important issues in terms of strategy work that were highlighted in the competitor and market survey.

The product's business volume has been quite steady over the past 10 years. The variations between years are big, but there has been no averagely significant change. Annual turnover is shown in Figure 18.

Figure 18. Product business annual turnover.



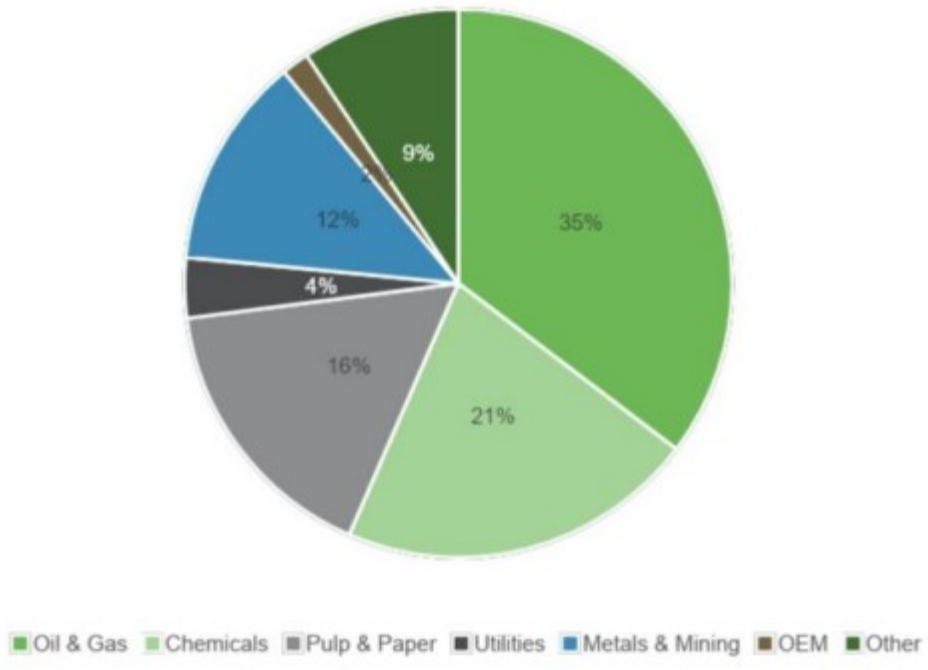
The business potential analysis assessed the business potential of different industrial segments from a product perspective in general. The survey shows that the oil, gas, and chemical industries have the largest volumes for the type of the product in question. Table 4 shows the market volume and growth potential of different industrial segments from a product perspective.

Table 4. Market potential of the product.

	Descpription
Oil & Gas	• The largest segments • The market size in this industry would be significant
Chemical & PetChem	• Relatively big segment • The market size here would be substantial
Food & Bev	• Mid size segment • Growing potential through market demands
Power Gen	• Notable market size • Good growing potential
Others	• Includes Pulp & Paper, metals and mining, manufacturing, water treatment, pharmaceuticals, and more. • Each of these industries has specific needs for the substance • Biggest growing opportunity for the company

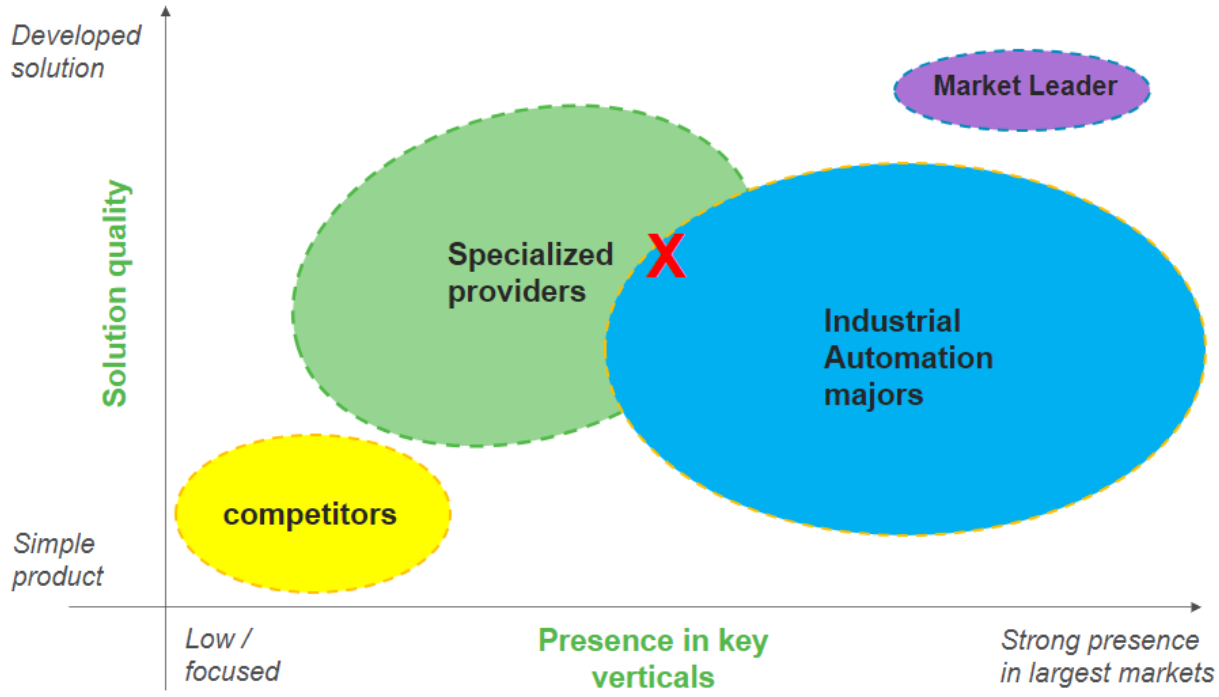
The existing business of the product in the company is divided into different industrial segments as shown in business breakdown in figure 19. The largest volume is in the oil and gas industry, followed by the chemical industry and the paper and pulp business in third place. The situation is therefore somewhat different in relation to the total market potential (table 4). This is largely due to the industries in which the company mainly operates.

Figure 19. Business breakdown.



Next, information was collected on the offering of a similar product in industry and the technological maturity of other companies' product and business volume compared to their own product and business operations were assessed. 15 competitors were divided into three different categories. The data were collected from various reports and companies' own sources, such as websites. The first category (competitors) generally included companies operating as a corporation wide in a same industry. The second category was Industrial automation majors, and the third category (specialized providers) were companies specializing in the business and product area in question. The different players were placed in a competitor field graph where the x-axis shows the presence in markets, and the y-axis shows the maturity and quality of the solution. Figure 20 is illustrative, but based on the study, it depicts the best idea of how different actors are placed on the map. The position of the company's own product is marked in the figure with 'X' between specialized suppliers and industrial automation majors. The figure also includes the market leader, who is considered to be significantly ahead of all other players in both business and product offering. It should also be noted that Industrial Automation majors often cooperate with Specialized providers.

Figure 20. Competitor field.



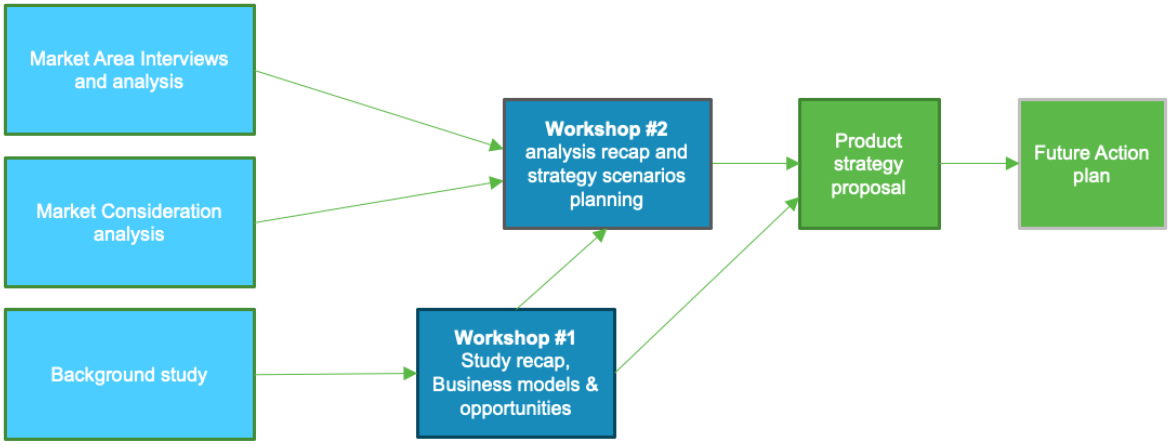
Companies in the third category (specialized providers) were subjected to further analysis. For each, the market position and its references, the industries in which the company operates, the product offering and its characteristics and advantages over competitors were evaluated in more detail. The analysis can be used to define product properties as part of product development.

Although not all information about the market and competitors can be determined, the information from the market survey helps in strategic planning from both a business and product perspective. It is important to know your competitors and your own position in the market. In strategy work this information can be utilized when planning and selecting strategic directions, whether to go into broad or narrow target scope and with lower cost of differentiation strategy as described in chapter 2.2 of the theory part (Johnson et al., 2017, p. 145).

8 Building a business and product strategy

This chapter describes the strategy process in practice. The research part is described in Chapter 5. The process followed the strategy work is shown in Figure 21, where two workshops were organized in stages after the studies. The same people representing the management of the business product groups, as well as strategy and product development, were invited to both workshops.

Figure 21. Strategy process diagram.



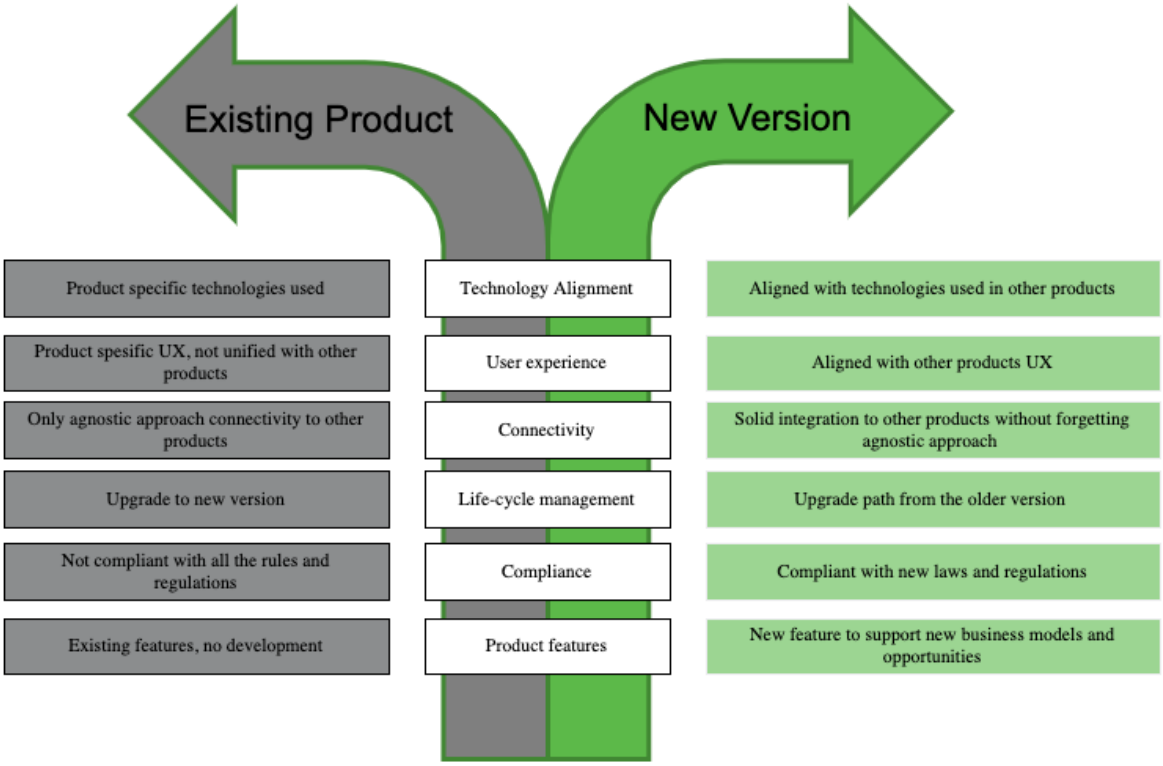
The first workshop dealt with background study material and focused on analyses of the state of the business, the product, and its technology. The functional part of the workshop focused on business strategy options and the opportunities they bring. Chapter 5.4.1 analyzed the interview survey on growth potential, which highlighted the potential of performance-based services business. The workshop discussed different business models and the growth potential they bring and made choices on how the business should be taken forward. The business strategy was examined from the perspective of the product's contract model, industries, business opportunities and models. Different perspectives were considered for each option, and delimitation was made based on it. If we compare the different contract and business models with the Porter model presented in chapter 2.2, some of the identified business opportunities are cost-driven and some are in line with the differentiation model. However, both are needed, which is why a hybrid strategy from a business point of view was selected. In the thesis, business strategy or related choices cannot be explained in more detail due to business secrets.

After the first workshop, an interview survey was conducted as part of the research part of the thesis, as well as a market and competitor survey. The results of these were analyzed

together with the management and strategic development to create sufficient basis material for the next workshop.

Based on the interviews, the first workshop and background studies, the sub-entities of the product strategy were examined at the heading level, and it was considered how these sub-entities are expected to change in the future product version. Figure 22 shows a comparison of technology, user experience, connectivity, lifecycle management, rules and regulations compliance, and product features between the current and new versions at the principal level.

Figure 22. Core areas of development across product generations.

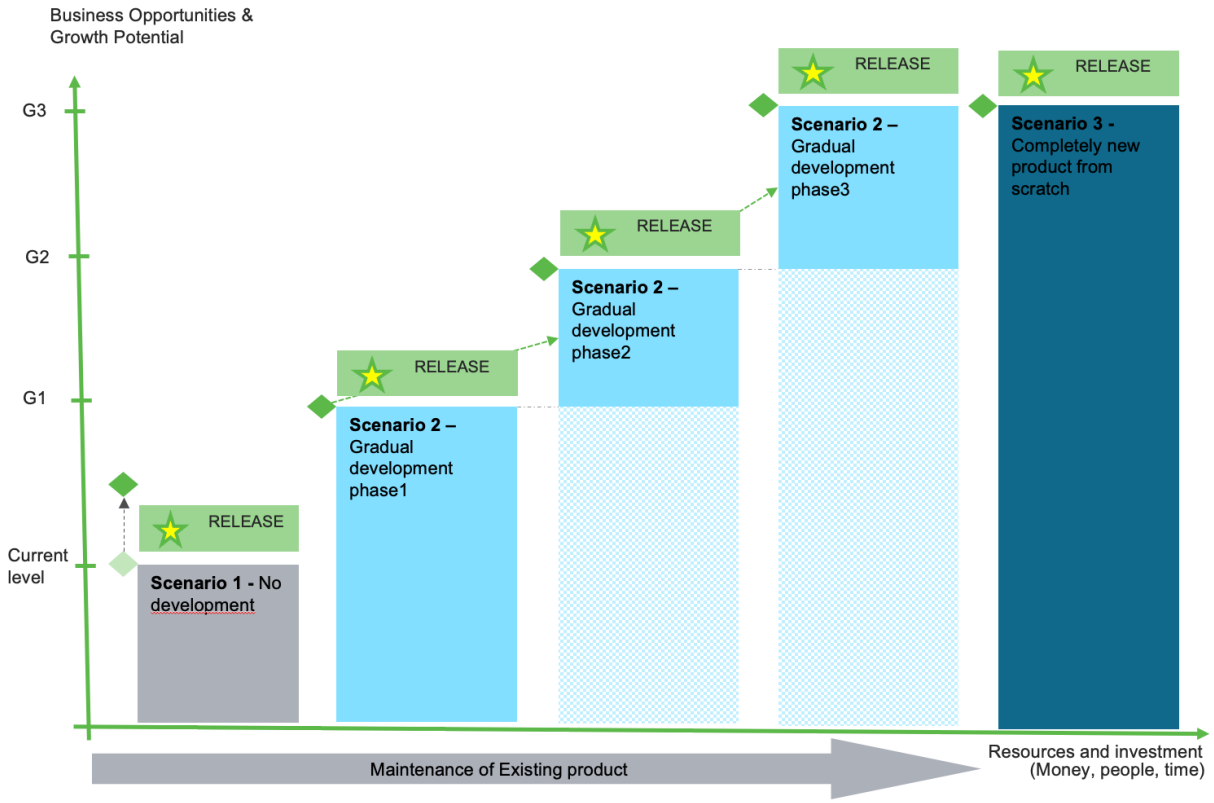


For the next workshop, research and market analysis were summarized, and based on them, alternatives for product strategy were assessed, also assessing their benefits, opportunities, and risks through a SWOT analysis. It helped to identify internal strengths and weaknesses, as well as external opportunities and threats (Viitala & Jylhä, 2019, chapter 2). Clearly differing scenarios were taken as scenario options for the product strategy, which were:

1. No development is done for the product.
2. Product development is divided into sections and gradual releases.
3. The product is completely rebuilt in one go.

The scenario options presented in Figure 23 apply the model previously presented in the theory chapter (chapter 3.1, Figure 6) with 2 variables along different axes. Here the X axis has resources (time, people, and costs) and the Y axis is the potential growth of the business. Scenario 1 does not include changes to the product, which means that the growth potential of the business is also the smallest and in practice it can be achieved through increasing volume. In option 2, a more detailed step-by-step plan is drawn up, in which the work is divided into several gradual releases.

Figure 23. Product strategy scenarios.



In option 3, there are no gradual releases, but the product is built with all the required features at once. Releases are marked with a star symbol in the figure. In all options, it is also worth remembering that the existing product has a large installation base, which requires maintenance and therefore also requires resources from the point of view of product maintenance, even if no new features are developed for the existing product.

After that the strengths, weaknesses, opportunities, and threats of the different scenario options were assessed through a SWOT analysis. The results of the SWOT analysis are summarized in Tables 5.1 to 5.3.

Table 5.1. Scenario 1 SWOT.

Strenghts	Weaknesses
• No extra R&D investments but maintenance of existing product	• No investment indicates that business will be ramped down and slowing down sales and motivation of people • Risk of losing expertise people
Opportunities	**Threads**
• Organic Growth with existing product with very small investment	• Business will start to slow down until it ends if "nothing" will be done due to ageing technology • Loosing install base to competitors

Scenario option 1 as the others requires maintenance of the current product, but no other R&D investments. In addition, growth can be achieved with very small investments through volume. However, this option would eventually lead to the complete ramp down of the business operations of a product that is already in decline state, and the risk of losing its experts is also significant if the company does not indicate that it is investing in the product anymore. Similarly, the gradual loss of the installation base to competitors begins.

Table 5.2. Scenario 2 SWOT.

Strenghts	Weaknesses
• Enables growth possibilities gradually • Fastest way to get releases out • Gradual steps to support business needs step by step	• Thin R&D resources (existing ones) • Difficulty to estimate total R&D investment • Existing product maintenance load • R&D execution will not be the most beautiful one under the hood • Implementation phase requires deep knowledge of the product
Opportunities	**Threads**
• Learning through the gradual releases and possibility to change the direction if there are changing in the environment	• Gradual releases does not meet customer requirements fast enough • Changing rules and regulations causing must have changes to the product

Option 2 (Table 5.2) consists of phased releases and thus enables gradual business growth through a new product offering. From the perspective of product development, interim gradual publications can be used to specify needs and goals and to change focus areas and direction of development if the business requires. One option to start would be refactoring of existing software code. That would tackle some of the requirements quite well, but on the other hand understanding the content of the code would be challenging. By refactoring time can be saved from detailed requirement specifications compared to option when starting from scratch. The pace of phased releases must be maintained at a sufficient level to ensure customer satisfaction, and changes and requirements caused by laws and regulations must be met. The current product must also be maintained until all the features needed and used by customers are available and the existing installation base has been updated to the new product version.

Table 5.3. Scenario 3 SWOT.

Strenghts	Weaknesses
• Brand new product from the scratch • Easiest way to implement all the features what is required without taking care of gradual development of existing product	• Major investment needed until getting sellable product out • Limited R&D resources and knowhow of the product causes severe risk for the development path • Difficulty to estimate total R&D investment • Existing product maintenance load • Requires heavy background work for definitions and requirements before development work can start
Opportunities	**Threads**
• Meeting all the customer requirements • Supporting all the business models requested and needed • Opening new markets	• Too long waiting time of completely new product to ensure business continuity and will collapse current market position • Changing business environment requirements does not meet with the scope selected • Changing rules and regulations causing must have changes to the product

In scenario option 3 (Table 5.3), a completely new product with new features could be built based on requirement specifications. From the point of view of product development work, this would be the most sensible option, as all requirements and features could be best met, and modern technologies could be utilized most efficiently. On the other hand, this alternative would require extensive definition and background work and the most resources. The waiting time for the release in this option is also long, and the maintenance of the current product cannot be avoided in this option either. The investment in the entire product development process until the first release reaches the market is large. To the extent that it is not possible to make a significant investment at once and shorten product development time, a long

waiting period in this option could mean the collapse of the current installation base and business if the current product cannot keep customers satisfied enough.

The scenario options for the product strategy were discussed in workshop no.2. It was attended by the same people as in the first. The results of the market analysis and interview survey were also reviewed. In the functional part of the workshop, it was considered what technical features are needed for the product and in what order to achieve business growth and selected the product strategy to be presented to the management for approval. The selections cannot be published in the thesis due to business secrets.

8.1 Next steps in implementation

The stages of the strategy process, discussed in chapter 3 in the theoretical part, were analyzed in the current state, objectives and necessary measures were defined. (Sutinen & Haapakorva, 2021, pp. 58–64). Based on the chosen product strategy, an implementation plan can be built based on these phases. For the project to progress, the functionality of the product should be further clarified. This requires a small team of experts who, using existing documentation describe on a sufficiently general level what the product does and what functional features it has. This helps different parties to understand the need the better, which correspondingly supports the development of the product and helps to understand its technical requirements. In chapter 4.2 of the theory part, this is the same as creation of product concept in Figure 11. Documenting the core intelligence of the product also from a risk management perspective is important, as current knowledge is only available to a few individuals.

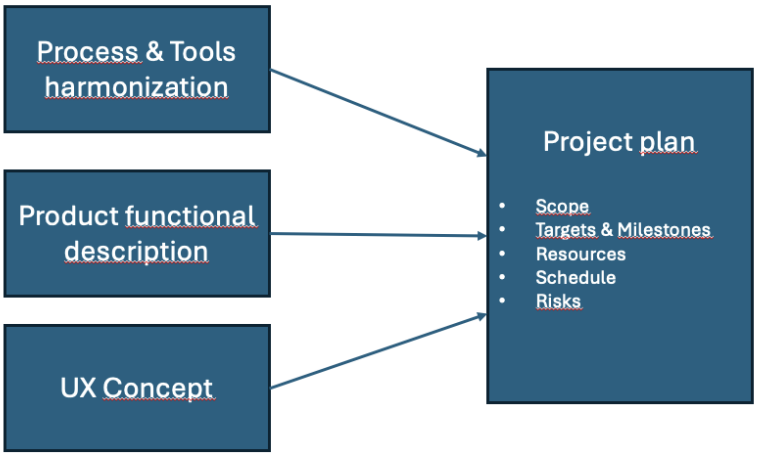
In parallel with this, the product development processes and ways of doing things must also be reformed. As the interviews and background study show, the responsibilities between the different roles are unclear. In particular, the roles and responsibilities of product portfolio management and product development should be focused. The current team has been around for so long that they know each other's doings and habits. If the size of the team is wanted to be scaled up, it requires a precise definition of roles and responsibilities so that new people joining the team understand what each person is responsible for. Roles and responsibilities must be defined, reviewed, and recorded between the different parties.

Whether it is a current product or a new version, the concept related to usability should be built to correspond to how both the current and the new product are connected to other company’s products or the customer's other vendor’s automation system. Based on this, it is possible to build a better user experience and consider the related implementation models

and future development needs. It lays the foundation for the user interface of the actual product and how it is used.

A project plan must be drawn up for a product development project based on the chosen product strategy and in accordance with the company's product development processes. The used gate project model requires compliance with a defined process. It defines the content of what needs to be done at each stage of the project and what requirements must be met when moving on to the next phase. To proceed to the next stage, the designated steering group must also approve the previous step. Figure 24 shows the first phases of the next steps as a flowchart, after which a more detailed product development project plan can be made.

Figure 24. First stages of the project.



The project plan is drawn up in accordance with the company's guidelines and it defines, among other things, the scope and objectives of the project, human resources and budget, schedule, and risks. When planning, it is important to consider the know-how of the existing product and the related knowledge transfer. Chapter 3.6. discusses competence management. As Viitala writes, the transfer and expansion of know-how from a few experts to new ones can be increased so that experts act as mentors for new team members and competence is transferred that way. From the perspective of risk management, it is important to ensure the continuity of competence in the future. (Viitala, 2021, chapter 3.6)

In product development projects, there are often many uncertainties related to technologies and workloads. Estimating resource needs and schedules is often difficult. For this reason, risk management as part of product development project management is important. Chapter 3.4 of the theory part describes a process that gradually defines how risks should be identified and managed.

9 Conclusions

As the interview survey showed, developing a business, or increasing its volume does not always require extensive product development efforts. Process and operational development can also achieve results. The short-term possibilities related to the interview survey are described earlier in the summary of the study in chapter 5.6.

This chapter analyses the different stages of the thesis and related observations and highlights the most important issues that should be considered in similar integration projects in the future. Although the focus here has been on the application product, the conclusions can be applied to other products as well. All the issues raised in this chapter can also be generally utilized outside the company the thesis is done to.

9.1 Research and investigation

The interview survey yielded good results. Its careful preparation is important to achieve results of the highest possible quality for later use. The definition of research questions, the choice of research method and interview questions should be carefully considered. In the interviews, it turned out to work well that the interviewer was an external person from the point of view of the product's business. Based on the experiences of the study, the interviewer is also not required to have in-depth knowledge of the product or its business, but a neutral, objective attitude and the ability to discuss constructively with the interviewees. The results of the interview must also be documented sufficiently comprehensively so that they can be effectively utilized. In the selection process of interviewees, responsibility must be assigned to a business or other organization so that they can choose the right people and thereby commit their own area of responsibility to the project. This also improves the objectivity of the answers and the reliability of the interview survey.

Environmental analyses are often carried out as part of the strategy process (chapter 3.3). They can be used to identify things or phenomena and to better understand interdependencies between factors (Dufva, 2022, p. 105). A comprehensive market and competitor survey produces valuable data for use in strategy work when it is possible to analyze business potential, competitors, and the market. Market research should be carried out by professionals who are familiar with the methods and tools to produce comprehensive material effectively. However, in-depth business, technology or product knowledge is not required from the author in this part either. An objective view from an outsider's point of view, which is not too much directed towards the subject, produced an excellent result. It is important to define the objectives, what issues you want to find out at the heading level about

the market and competitor field, without going too deep into the substance in the orientation of the author of the study. With the help of market research, the strategy process analyzed the industry and competitor field, as well as where the company itself is positioned in the market. Its findings are valuable as part of business strategy work.

A background study carried out by an external party in laying the groundwork for the project also proved to be effective. This background study covered both the state of the business and issues related to the product's technology. The external party did not know the background of the product and business, which allowed them to look at things objectively from an outsider's point of view. In their report, the value lies largely in its objectivity, which means that no internal interest or interface of the company drives it in a certain direction, but the analysis is carried out purely based on the interview results. Politically, the impact can be significant in a company if decision-making involves conflicts and internal tensions. Careful documentation of these is important, because after the survey, its authors may not be available. The report must be of high quality and comprehensively reviewed in its entirety by sub-entity, and before approving the result, it must be ensured that your company has a comprehensive understanding of the results and that the study carried out by an external party can be efficiently utilized as part of strategy work.

In all three different research entities, it is important to make a careful requirement specification of what you want to find out at different stages, as well as a plan for the schedule and resources. Careful background work enables a comprehensive understanding of the current state and future needs from the perspective of both business and technology as part of strategy work.

9.2 New product design and technology selections

As described in chapter 4.2 the design of a new product or a product modernization project should always be considered from a business point of view. The product is defined according to the needs of the business. The investment used is often determined by the size of the business and its growth potential. The process has multiple stages. (Mital, 2014, pp. 23–25)

In her book, Valpola refers to the meaning of the feedback when trying to understand customer needs and creating a technology strategy. Without having a feedback process in place, there is lack of important strategy input. This is more explained in the chapter 2.3 last paragraph. (Valpola, 2021, pp. 202-203).

However, it should also be understood that in a product portfolio, a single product does not necessarily constitute a significant business on its own, but its significance in the product offering may be solely or partly strategic. In addition to business growth, strategy work should focus on indirect impacts and what other business can be lost if the product in question and its characteristics are missing from the company's product portfolio.

As shown in the theory part of the thesis (chapter 2.3, figure 11), the business strategy should guide the product strategy (Trott, 2021, p. 493). Sometimes selections in product development work are made incompletely from technical starting points, and the selections do not recognizably support the business needs or there is no business plan behind them to justify the project. It is important to understand and know what you want to do with the product and what features are needed to meet your business goals. After that, selections can be made for the technologies. Technology selections should primarily always be made according to business needs, not the other way around. On the other hand, a good choice of technology can improve efficiency and competitiveness.

Especially in large companies with a wide product portfolio that includes many different products of different ages, maximum attention should be paid to harmonizing technology selections to save resources and guarantee quality. Different product development teams and product organizations must support each other in technology selections, and they should never be made solely from the perspective of sub-optimizing the efficiency of an individual team. When technology choices are made in product development projects, they must be built into the gate model of the product development project, so that the dependencies of parallel software development projects are systematically considered already in the early stages of the project, and that the same technologies are favored between different products and product families. In this case, the technical debt caused by differing choices can be minimized and synergies between different product development teams can be achieved. Even more proactive life cycle planning and work is required when technologies are harmonized, because the risk severity caused by single technology when it is in use in multiple products. Therefore, in the risk planning optional technology options should be available and able to be taken into use with relatively minimal effort.

The management of technology selections also includes a systematic review of the technologies in use and their life cycle. The life cycle behaves according to the S-curve shown in Figure 10, and changes should be observed proactively in the organization (Mital, 2014, p. 15). This is not always possible, because changes can come unexpectedly. Too often, many evolutionary changes in technology, whether due to availability or new technology, are reactively reacted. A proactive approach requires continuous monitoring and

systematic product and technology portfolio management. Good communication between different stakeholders using the same technologies or supplying them to the company is also required. In certain cases, different companies that do not compete can work together to solve technology challenges such as information security.

9.3 Technical debt

Whether a new product became part of a company's product portfolio because of an acquisition or other company reorganization, the technologies of the products to be integrated into the portfolio should be carefully examined. For example, the due diligence process often focuses on product law and patents, but the content of products from a technological perspective is not examined in sufficient depth. However, whether it is software products or hardware, the technical debt in them can be significant.

For example, outdated software technology in use or a microprocessor at the end of its life cycle may cause the launch of a large-scale product development project to ensure business continuity. Problems can be caused by, for example: poorly documented or confusing software structure, security technology challenges, and neglected maintenance.

The technologies should be reviewed by experts and a plan with risk assessments should be made for the products before making an integration decision. The risk assessment should focus on the maintenance load of the products and what skills it requires. Well-planned technology integration, where technical debt is considered, can be a significant competitive advantage but also a prerequisite for the continuation of profitable business.

9.4 Product lifecycle management

The technologies discussed in the previous chapters have a life cycle that also affects the life cycle of the product. From the end user's point of view, business needs are more relevant. As Hannila describes in her doctoral dissertation, two different challenges can be identified in relation to product lifecycle management: replacing old products with new ones and how to respond to market needs with new technologies while maintaining competitiveness. (Hannila, 2019, pp. 56–57)

In terms of business logic, approaching these challenges from the perspective of practical scenarios can help in practice. In both cases, it is possible to consider what kind of use cases are in the installation base and how they can be approached. Especially in the service business, the model is often phased, aiming primarily at maintaining the company's own

installation base and building new business through it. Compared to the individual consumer, industry takes a much more conservative view of modern technologies. The industrial customer's priorities are usability, reliability, safety, and security. When designing new products, it is important to ensure that product development projects are directed in the right order according to business needs and priorities.

9.5 Roles, responsibilities, and processes

For the integration to succeed well, the portfolio management and product development of the product to be integrated must follow the same tools and methods as are otherwise used in the company. Especially when a product development team is wanted to be expanded and bring in new people, roles, responsibilities, and processes must be clearly defined. This has an impact on the agile way of working and quality of operations of the organization. It is good to understand the current operating model of the product to be integrated and compare it with the company's otherwise used operating model. This does not mean that the ways of working should be the same on daily basis for example from the perspective of software development cycles, but the basic processes in use, such as the product development project model or the definition of product management responsibilities, must be documented and harmonized as much as possible.

From a sales perspective, the products to be integrated should be brought into the same tools and processes as the company's other product portfolios as quickly as possible. This facilitates the change, acceptance of a new product and in a large global organization and streamlines operations in both the sales and delivery phases. Product documents and other material must be available through common distribution channels and up-to-date information must be ensured. The more an organization is geographically dispersed, the more harmonized, systematic way of working makes it easier to manage the whole.

9.6 Competence development and management

The continuity of critical competence is important. Especially in integration projects, expertise is always in the organization to be integrated. Its continuity must be ensured. This often means systematic documentation of the core issues of the product, which requires in-depth experts on the subject. Succession planning should be done for important roles, and competence risks should be managed through a risk management plan.

Competence management in sales and delivery organizations should be mapped with a current state analysis based on which training plans can be built by region according to

business requirements. Right timing is also important. The certification program can be used to ensure sufficient competence in the specified organizations.

9.7 Summary of conclusions

The topic of the thesis was the strategy of a software project to be integrated into the product portfolio. The study examined how sales can be increased in the business areas and which factors have the greatest impact on the customer's purchasing decisions, as well as the technical customer requirements that the current product version contains and what it lacks. The interview survey, conducted as a follow-up to the previous background study, broadened and deepened global views on how business can be grown and what it requires. The study also highlighted issues that do not require R&D investments to be fixed. These include e.g. sales processes and support, improving the customer feedback process, improving and availability of sales materials, and regional competence development.

The product subjected in this thesis needs to be modernized. To support customer requirements, the product must be built into a modular entity, its usability and connectivity must be improved, and technologies must be selected to support current industrial requirements.

When decentralizing responsibilities from a centralized, global team to regional organizations, a systematic approach and existing, ready-made operating models are important. This way, everyone knows how to act in the right way, business management is easier, and the quality of deliveries can be better guaranteed. The volume of sales can be increased through increasing capacity and increasing competence. The greatest growth potential of the business is seen in operating in the same customer field as for other products and seeking growth through service sales and performance-based contract models.

The technology strategy must be built according to the terms of the business, and the choices of technologies and product development projects are made according to the needs and priority of the business, considering the utilization of other technologies available in the company. In software product integration projects, it must also be considered the technology used and the technical debt they may cause. So, the risks can be prepared for, and potential business and resource impacts can be assessed. Across a company's product portfolio, responsibility roles and processes should be defined to manage and select the technologies in its products.

A company's product portfolio forms an entity in which the role of an individual product can also be strategic and support the business of other products. There are a wide range of tools

and operating models for strategy work, of which scenario work has been utilized here, supported by SWOT analysis. Research in the strategy process is time-consuming, but also produces results. For this reason, a systematic approach to the integration process is important and it should also focus more deeply on technology topics.

The results of the thesis can be widely utilized in different organizations. The operating model applied in the planning and implementation of a similar project helps in systematic approach, and the phases and findings contained in it support the implementation of integration projects.

In their book Sutinen & Haapakorva (2021) comprehensively discuss the strategy process. Good strategy work requires a systematic approach and a lot of background work, discussion with different parties and a determined approach. It is important to have a discussion and try to understand different perspectives related to roles, geographical location, and organization so that all the necessary interfaces and perspectives can be noted. The basic elements of strategy work are always the same. First, you need to find out the current state and define business goals. After that, you need to identify what is required to achieve the goals and draw up an action plan to achieve the goals. (Sutinen & Haapakorva, 2021, pp. 58–64)

The topic of the thesis was the business and product strategy of a software product, which followed this model. First, the current situation was clarified with the help of research and analyses. After that the goals and strategic planning was done. Then the execution plan for the next steps was defined about the actions needed to achieve the goals.

10 Epilogue

For me, the thesis was interesting. The topic was concrete, and it combined the content of the master studies and practices of technology competence management well connected to my own work environment. Overall, the work was successful. The tight schedule put pressure on the completion of the work, but on the other hand, it also forced to proceed on schedule. If desired, the research phase could have been expanded to include clients in the scope of the interview. However, due to scheduling reasons, this was not possible. The quality of the interviews, together with the market survey, created an excellent basis for strategy work.

In a modern learning environment, the use of artificial intelligence can be utilized in many ways. In my thesis I used artificial intelligence for example for translation, editing the text to make it more readable, and searching for sources and good keywords that made it easier to find written sources. Artificial intelligence as a tool facilitates learning, which is why it is worth knowing how to utilize it in the right way. From the perspective of professional development, this learning experience increased my comprehensive understanding of strategy work, and especially how comprehensive strategy work requires a lot of different skills in, for example, business, product development, sales, and product management.

I believe this thesis will support the company for which it was made and help others to find out topics to be considered when doing the strategic planning of the products to be integrated as part of company’s portfolio.

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Appendix 1. Thesis data management plan

Storage of Research Data

The research material used is interviews, a previous background study related to the software product being worked on, and a market study. All documents are owned by the client and stored in a location specified by the client, on the Microsoft Teams desktop opened for the job, which can only be accessed by limited people. The contact person of the person ordering the work acts as the approver of the rights to the material.

The interview survey material is stored in free text format in the location mentioned above. The name of the interviewee is also marked in the interview material. A textual transcription of the material will also be made. No names are included in the published material, but only the top-level function (e.g. sales, product development) and market area (e.g. North America).

Material backups are handled automatically in accordance with the company's IT practices. The material is mainly processed electronically directly at the storage location (MS Teams) and does not need to be sent or printed separately for use. The person making the thesis works for the client company and has a non-disclosure agreement (NDA) related to his position, which also applies to the content of the thesis. No separate research permit is required.

Processing of personal data and sensitive data

As such, all research data is intended for internal use only. Only the market area (e.g. North America, South America, etc.) is recorded and published on the results of personal interviews on the job. All thesis-related material is processed electronically. The interview material is processed directly on the limited, closed Teams desktop and no printouts or offline copies are taken, which improves the security of the material.

Ownership of thesis material and further use of the material

The client owns all materials and results related to the work. The research material will not be used further. The data is stored securely for one year from the date of approval of the thesis, so that the results of the thesis can be verified if necessary and then destroyed in a secure manner.